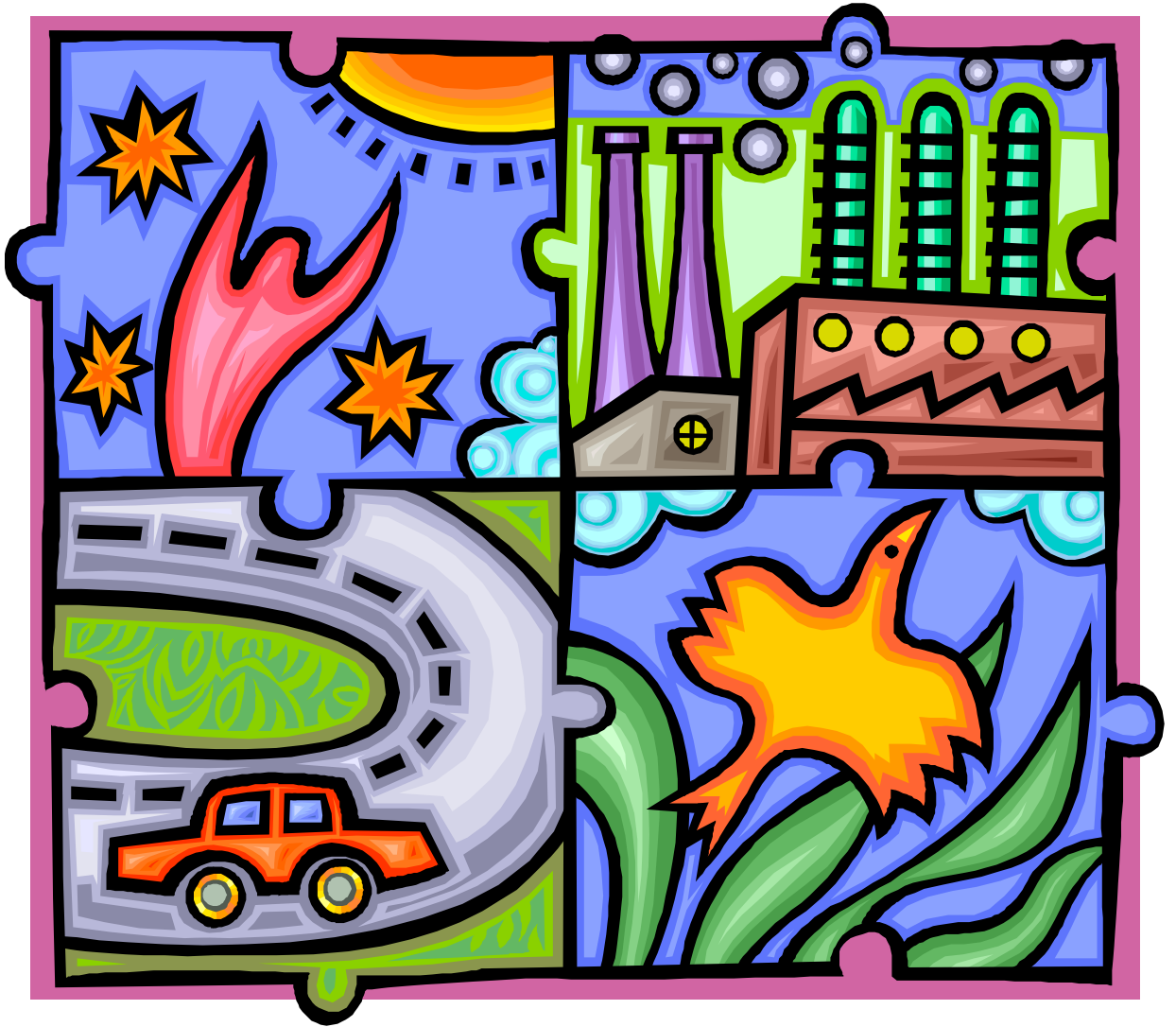


# *Public Safety Element*



*City Planning Department  
City of Long Beach  
General Plan Program*



# Long Beach General Plan Program

## Public Safety Element

Long Beach Planning Department

May 1975

(Reprint 2004)



## **CITY COUNCIL**

Edwin W. Wade, Mayor  
Bert Bond, Mayor Pro Tempore  
Dr. Thomas J. Clark  
E. F. (Ted) Crunchley  
Donald W. Phillips  
Russell Rubley  
Eunice N. Sata  
Rene B. Simon  
James H. Wilson  
John R. Mansell, Manager

## **CITY PLANNING COMMISSION**

W. Robert Pierce, Chairman  
Weckford Morgan, Vice Chairman  
Shirley Blumberg  
Walter J. Desmond  
John Grindle  
Travis A. Montgomery  
Dr. Richard Sugiyama

## **CITY PLANNING DEPARTMENT**

Ernest Mayer, Jr., Director

This document is one of many which together comprise the new comprehensive General Plan for the City of Long Beach, California. It not only complies with California legislation regulating the preparation of official planning documents, but also is expanded beyond the legislation to meet the special needs of Long Beach.

The General Plan is subdivided into a number of different subjects, entitled "elements." Some elements are mandated by State law, while others are optional. The Long Beach General Plan will contain the following elements:

Open Space*	Circulation*
Conservation*	Population
Seismic Safety*	Environmental Management
Noise*	Coastline
Scenic Highways*	Urban Design
Public Safety*	Others, as determined during the
Housing*	course of the program
Land Use*	

---

Elements identified by a star (\*) are mandated by State law.

All of the elements are intimately interrelated and, therefore, none should be viewed entirely alone without reference to other elements.

The elements will be prepared and issued sequentially, on a schedule determined by mandated deadlines, manpower availability, informational needs, and other variables.

Inquiries regarding information contained in this document or related to the General Plan program should be directed to the:

City Planning Department  
Room 401 City Hall  
205 West Broadway  
Long Beach, California 90802  
(213) 436-9041  
Earnest Mayer, Jr., Director

# TABLE OF CONTENTS

Section	Page
<b>I. INTRODUCTION .....</b>	<b>1</b>
Scope and Purpose of Study.....	1
Interagency Cooperation .....	2
Report Outline .....	3
<b>II. SAFETY AND PUBLIC OPINION .....</b>	<b>9</b>
<b>III. GOALS FOR PUBLIC SAFETY .....</b>	<b>13</b>
Management Goals .....	14
Development Goals.....	14
Protection Goals.....	15
Remedial Action Goals.....	16
<b>IV. FIRE PROTECTION .....</b>	<b>19</b>
Organization .....	19
Fire Suppression .....	19
Bureau of Technical Services.....	22
Bureau of Fire Prevention.....	22
Bureau of Instruction .....	23
Types of Fires.....	23
Fires by Occupancy .....	23
Fires by Cause .....	24
Fires by Zones.....	26
Hazard Areas.....	30
Factors Affecting Fire Potential .....	31
Insurance Services Rating for Long Beach .....	32
Water Supply .....	37
Equipment and Training .....	38
Communications.....	38
Fire Prevention .....	39
Land Use and Loss Potential .....	40
Commercial Districts.....	40
Industrial Districts .....	41
Institutional Districts.....	41
Residential Districts .....	42
Existing and Proposed Fire Stations .....	42
Station Location Factors .....	46
Land Use Factors .....	46
Topography and Geography.....	47
Traffic and Circulation.....	47
Site Requirements .....	47
New Fire Stations .....	48
Codes and Standards.....	48
High Rise Structures.....	49
Open Stair Wells.....	50
Dense Developments .....	51
Pre-fire Preparation .....	51

## TABLE OF CONTENTS (continued)

Section	Page
<b>V. GEOLOGIC HAZARDS</b> .....	<b>55</b>
General Geology .....	55
Seismic Hazards.....	56
Mudslides and Landslides .....	63
Erosion .....	64
Flooding.....	64
Subsidence .....	65
<b>VI. CRIME PREVENTION</b> .....	<b>71</b>
Police and Society.....	71
Long Beach Police Department.....	72
Crime in Long Beach .....	73
Crime Prevention Through Physical Planning.....	75
<b>VII. UTILITIES</b> .....	<b>83</b>
Utility-related Hazards .....	83
<b>VIII. INDUSTRIAL/TRANSPORTATION</b> .....	<b>88</b>
Industrial Land Use .....	88
Transport of Hazardous Materials .....	88
Aircraft Safety.....	90
<b>IX. DISASTER OPERATIONS</b> .....	<b>96</b>
Emergency Operations Center (EOC).....	96
Manpower .....	97
Communications .....	97
Evacuation.....	98
Community Resources .....	100
Disaster Assistance .....	101
Disaster Exercises .....	101
Citizen Safety .....	102
<b>X. RISK MANAGEMENT</b> .....	<b>107</b>
Levels of Risk .....	108
<b>XI. RECOMMENDATIONS</b> .....	<b>115</b>
Immediate Action Recommendations.....	115
Advance Planning Recommendations .....	118



## TABLE OF CONTENTS (Continued)

Section	Page
APPENDIX A .....	125
BIBLIOGRAPHY .....	131
PROJECT TEAM .....	133

### TABLES

1. Fire Stations and Equipment .....	20
2. Fires by Occupancy .....	23
3. Fires by Cause .....	25
4. Number of Fire, False Alarm, First Aid and Non-Fire Incidents by Zone....	29
5. Fire Rating Survey for Long Beach, 1973 .....	37
6. Police Department Personnel by Division .....	72
7. Part I Crime Rate per 100,000 Population 1967-1974 .....	76
8. Results of Questionnaire Regarding Risk Acceptability .....	111

### PLATES

1. Fire Stations and Equipment .....	21
2. Fires by Occupancy .....	28
3. Fire Hazard Areas .....	33
4. Building Age .....	34
5. Building Condition .....	35
6. Generalized Intensity of Variable Factors.....	36
7. Fire Station Locations.....	45
8. Marsh and Fill Areas .....	59
9. Groundwater Contours .....	60
10. Fault Map of Long Beach .....	62
11. Areas of Potential Flooding .....	67
12. Industrial Land Use .....	82
13. Transportation Routes .....	91
14. Community Disaster Resources .....	95



# **INTRODUCTION**



## I. INTRODUCTION

The State of California requires a Safety Element as part of all city and county general plans. Government Code Section 65302.1 mandates the creation and adoption of this element. Furthermore, the California Council on Intergovernmental Relations has promulgated advisory guidelines to be used in developing this and other mandatory plan elements. According to these guidelines, the Safety Element is to be tied in with social, economic, and environmental factors in the general development plan.

### Scope and Purpose of Study

Aside from the matter of complying with State law, there are numerous objectives to be attained in completing the Safety Element:

1. Identify all public safety items, which relate to the General Plan.
2. Incorporate public safety considerations into the overall planning process, to add another dimension of insight and greater comprehensiveness to the Long Beach General Plan.
3. Suggest methods for achieving maximum feasible safety for citizens.
4. Recommend measures to reduce the probability of loss of life, injuries, damage to property, and economic and social dislocation resulting from fire, dangerous geologic occurrences and most other natural and man-created hazards.
5. Provide Citizens with an increased sense of security and well-being.
6. Set forth means of correcting and/or mitigating hazards.
7. Inform citizens of potential safety problems and provide information regarding emergency situations.
8. Assist public safety officials in dealing with matters of safety and emergency occurrences.

9. Assure that physical manifestations of safety considerations are reflected in the General Plan.

In completing the element, only considerations of “general public safety” have been addressed. Private accidents or lesser hazards, which might only involve single individuals, were not considered. Items such as automobile accidents, swimming deaths, household safety and industrial plant safety are not dealt with in this particular element. Attention is given primarily to those hazards, which could affect large segments of the general population.

The element is principally a planning document and is in no way an “operations” plan or a “recovery” plan, although these matters are considered to the extent that they may have a bearing upon the planning process. One must understand, for example, the operations of those City departments which provide direct disaster-assistance services to the public in order to provide meaningful plans for lessening the risks and/or allowing the direct-service departments to function more effectively. By and large, the Element is an exercise in preventative planning. In other words, what planned improvements can be effectuated so as to provide a safer environment for the citizens and visitors of Long Beach? While information relating to manpower, rescue facilities, and so forth is included as inventory items, improvements in such specialized operations-oriented matters is largely an internal matter to be handled by the departments and/or agencies directly responsible for providing the services. However, it is hoped that the planning exercise will serve to assist the departments in reviewing and up-dating their operations plans.

Information presented in this report is not only of value for its own sake, but will also be most beneficial as background knowledge for completing other general plan elements, which will be undertaken later in the planning stages.

#### Interagency Cooperation

As an initial effort to accumulate information and tap expert opinion in the various specialized areas of public safety, all City Departments and numerous

private interests were sent questionnaires regarding hazards and the methods of dealing with them. Subsequently, general meetings were held with all of the involved individuals to gain further inputs and establish the scope and depth of the element. Due to the vast array of public safety considerations, and the interrelationships of potential hazardous events, general subject areas were established. Each of these subject areas is discussed in a separate chapter of the report, and is summarized below.

### Report Outline

#### Safety and Public Opinion

In recent years there has been an increasing emphasis upon citizen participation within the planning process. If plans and developmental policy are to become realities, they must reflect public attitudes and opinions. As a means of reaching the general citizenry, the City contracted with a professional public opinion research group to survey a representative sample of the total Long Beach population. This section discusses the respondent's view of the importance of public safety within the community.

#### Safety Goals

After the preliminary gathering of all salient information, goals were formulated and presented in this chapter.

#### Fire Protection

This section presents established fire demand zones, which are determined on the basis of hazards, station locations, manpower and equipment. Specific fire hazardous land uses are delineated and fire protection measures are recommended.

#### Geologic Hazards

A thorough geologic profile is presented for Long Beach. Factual information regarding soil types, groundwater levels, and topography is provided. Furthermore, an evaluation is made of the following geologic hazards:

earthquakes, liquefaction, tsunamis, landslides, erosion, flooding, and subsidence.

### Crime Prevention

An analysis of crime in Long Beach is presented, along with a general discussion of law enforcement theory. The major emphasis in this chapter, however, is the matter of crime prevention through physical planning.

### Utilities

Major utility operations are both a community resource and a potential hazard. While risks are minimal, possible utility-related hazards are identified.

### Industrial/Transportation

Like utilities, industrial and transportation related activities are essential to the livelihood and economic well being of the community. Nonetheless, certain industrial land uses, and the transport of hazardous materials do pose certain safety risks.

### Disaster Operations

Through the City's Department of Emergency Preparedness, elaborate provisions for disaster operations have been established. Manpower, communications, evacuation, community resources, and safety for citizens are discussed and reviewed.

### Risk Management

Due to recent changes in Federal and State laws requiring cities to better insure themselves against all types of hazards, a relatively new field has emerged which encompasses all aspects of public safety. This new area of expertise is most often referred to as risk management. This section discusses the concept of risk management and the process of establishing levels of acceptable risk.



## Recommendations

Major findings are in this section and program and/or ordinance related recommendations are proposed. Policy guidelines are also established in terms of the safety considerations of land use planning.



# **SAFETY AND PUBLIC OPINION**



## **II. SAFETY AND PUBLIC OPINION**

In recent years there has been an increasing emphasis upon citizen participation within the planning process. If plans and developmental policy are to become realities, they must reflect public attitudes and opinions. While it is impossible to obtain direct input from every resident, there is ample room for participation by all population segments and interest groups.

Citizen participation is actually a nebulous concept with its importance determined by the way in which it is defined. It does not always appear in the same form and thus cannot be assigned a single definition. In the strictest sense, citizen participation might mean the active involvement of the public as an integral part of the decision-making process of government. A broader interpretation of the term refers to the individual's privilege to express personal desires and criticisms to a receptive government.

An attempt is being made to involve Long Beach residents to the greatest extent possible in the various elements of the General Plan. Meetings and work sessions are held on a continual basis with numerous community officials and bodies. As a means of reaching the "average" citizen, the City contracted with a professional public opinion research group to survey a representative sample of the total Long Beach population.

602 "in-home" interviews were conducted with a representative cross-section of adults residing in the City. The interviews lasted roughly one hour and consisted of questions soliciting opinions regarding the future of Long Beach. The questions and issues broached in the interviews were thoroughly reviewed and critiqued prior to administering the survey to assure complete impartiality and that substantive answers would be obtained.

Numerous categories of opinions were revealed and in many instances public priorities were established as a result of respondents choices. Of special interest in this Element is the high priority respondents placed upon safety in the community. "When respondents are asked to enunciate appropriate goals which would contribute to making a city a good place to live, the most highly thought of

categories involve the provision of: good fire and police protection; good hospitals and medical services; good schools; personal safety in the streets; and a low crime rate.”<sup>1</sup> In conducting the survey, the research group presented a list of sixteen different items or characteristics and asked the respondents to rank them in order of importance. This question was not intended to reflect current conditions, but rather to evaluate goals for the City. “An examination of the response disclosed one paramount fact: that the sample believes that a good record in crime and personal safety-related areas is the most important goal to which a city should aspire; three of the five most highly rated goals relate to this area (i.e. good fire/police protection, low crime rate, personal safety in the street).”<sup>2</sup>

---

<sup>1</sup> Opinion Research of California, Citizen Attitudes Toward Future Development (Long Beach, California, March, 1974), p. 11.

<sup>2</sup> Ibid. p. 14

# **GOALS FOR PUBLIC SAFETY**





### III. GOALS FOR PUBLIC SAFETY

Public policy should ideally reflect the values held by the community at large. The term “value” is abstract and difficult to define exactly. Generally, values are the basics that govern human behavior. Because of the level of abstraction involved, it is difficult to measure or discuss public safety in terms of its consistency or conflict with community values. To discuss community values in terms of public safety, these generalizations must be converted into a tangible and understandable level. Values must be stated in terms of specific community goals: in other words, the importance of public safety, as expressed in the public opinion survey, must be reflected in a set of formulated goals.

Goals give form to the community values, which reside in an urban area in statements of aspiration. Thus, a goal may be defined as desired state or condition toward which effort is directed. It is an end to be sought although it may not be attainable. Goals should generally be stated in the “positive” and should not be solution oriented. Goals should state the desired end results and not be concerned with the specific actions necessary to achieve them. This practice will avoid biases toward particular actions.

Many City Departments have established goals for the operation of their particular functions. Likewise, other elements of the general plan set forth goals toward which the City should strive. In many instances, the public safety goals are interrelated with other community aspirations. The interrelationship may be complementary or conflicting. The attainment of a particular public safety goal may produce a beneficial by-product, resulting in the achievement of other related community goals. Contrarily, movement toward the attainment of a public safety goal may be in conflict with other desired aspirations. When such is the case, compromises and tradeoffs are essential. This does not imply that some of the goals are invalid. Nor should it lessen the effort to attain all of the established community goals. It simply means that each goal cannot be fully achieved and that in some instances less than “ideal” circumstances will prevail. Just as community values were put to work in establishing the various goals, so must

these abstract values come into play in determining the degree and direction of compromise. It is essential that public safety considerations and goals be viewed as single purpose objectives and that absolute public safety (absolute achievement of the stated goals) is often unfeasible due to other constraints or community desires.

To be effective and operational, goals must be dynamic and flexible. The importance and timely significance of various goals must be continually reviewed if they are to remain of value to the community. Goals must often be altered, updated, deleted, or added in response to changing circumstances within the City. Thus, the following list of public safety related goals is not necessarily exhaustive or immutable.

#### Management Goals

1. Develop mechanisms for implementing improved safety considerations.
2. Coordinate and cooperate with other political jurisdictions in implementing safety and disaster programs.
3. Continue to coordinate safety matters throughout the City and introduce methods of insuring improved safety.
4. Promote cooperation of the private sector in upgrading safety precautions.
5. Establish safety guidelines to evaluate all potential safety hazards and mitigate existing problems.

#### Development Goals

1. Promote the redevelopment of areas, which may present safety problems.
2. Utilize safety considerations, as a means of encouraging and enhancing desired land use patterns.

3. Provide an urban environment, which is as safe from all types of hazards as possible.
4. Continue to identify existing or proposed uses or activities that may pose safety hazards.
5. Use physical planning as a means of achieving greater degrees of protection from safety hazards.
6. Encourage transportation systems, utilities, industries, and similar uses to locate and operate in a manner consistent with public safety goals.
7. Assure continued safe accessibility to all urban land uses throughout the City.
8. Encourage development that would be most in harmony with nature and thus less vulnerable to natural disasters.
9. Encourage development that would augment efforts of other safety-related Departments of the City (i.e. design for adequate access for firefighting equipment and police surveillance).
10. Strive to encourage urbanizations patterns, which preserve and/or create greater safety for residents and visitors.
11. Critically evaluate proposed public or private actions, which may pose safety hazards to residents or visitors.

#### Protection Goals

1. Use safety precautions as one means of preventing blight and deterioration.
2. Protect existing land uses from the intrusion of safety hazards.
3. Reduce public exposure to safety hazards.
4. Effectively utilize natural or man-made landscape features to increase public protection from potential hazards.

5. Reduce the potential adverse economic, environmental, and social conditions, which could result from a major disaster.
6. Assure continued economic stability and growth minimizing potential safety hazards.
7. Protect the citizens against possible personal loss resulting from disaster events.
8. Assure continued safety measures for the preservation of property values.
9. Continue to inform the public of potential safety hazards and what to do in times of emergencies.
10. Provide the maximum feasible level of public safety protection services.

#### Remedial Action Goals

1. Isolate areas of hazardous concern from other portions of the City.
2. Eliminate uses which present safety hazards.

It is important to note that the above listed goals serve to direct actions and represent desired end-results. There are various specific methods and strategies, which may be employed in implementing or achieving the established public safety goals. The Recommendations section of this report will set forth some of these specific actions.

# **FIRE PROTECTION**



#### IV. FIRE PROTECTION

Fires are generally categorized into two major types: urban fires and brush fires. As the City of Long Beach is virtually all developed, the latter category is of little concern in matters of public safety. In many respects this is advantageous in that precautions and controls are easier to implement in urbanized areas than in undeveloped areas where access may be poor, water pressure low or non-existent, and fire containment difficult. On the other hand, urban areas present a greater demand for better fire protection, as the potential loss of life and property is much greater, and where higher capital costs are involved.

##### Organization

Originally established in 1987 with two hose carts and a ladder wagon manned by volunteers, today the Long Beach Fire Department consists of 466 employees, 431 whom are uniformed fire fighters. The department consists of four major divisions; Fire Prevention, Fire Suppression, Bureau of Instruction and the Bureau of Technical Services.

##### Fire Suppression

The Fire Suppression Division, better known perhaps as Fire and Rescue, is by far the largest division within the Fire Department. It is further divided into four Battalion districts, each of which is commanded by a Battalion Chief. There are presently 21 separate fire stations throughout the City, equipped with various types of trucks and fire-fighting apparatuses. (See Table 1 for inventory and Plate 1 for location.)

TABLE 1  
FIRE STATIONS AND EQUIPMENT

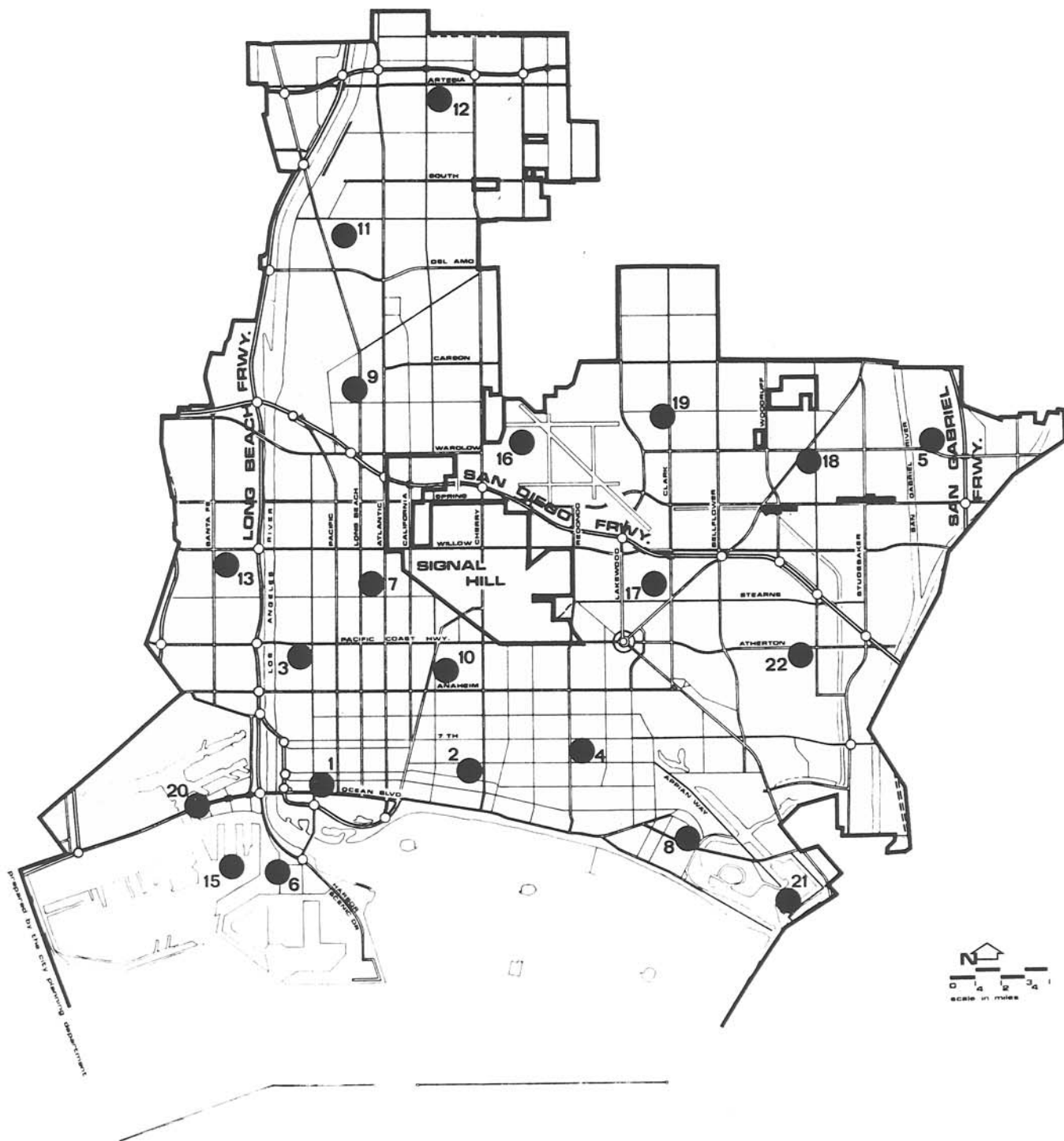
---

<p>Station #1 100 Magnolia Avenue 1 – 1250 gpm Pumper 1 – -100' Aerial Ladder 1 – Squad/Rescue 1 – Paramedic Unit</p>	<p>Station #11 160 Market Street 1 – 1250 gpm Pumper 1 – -65' Aerial Ladder 1 – Paramedic Unit</p>
<p>Station #2 1645 E. Third Street 1 – 1250 gpm Pumper</p>	<p>Station #12 6509 Gundry Avenue 1 – 1250 gpm Pumper</p>
<p>Station #3 1222 Daisy Avenue 1 – 1250 gpm Pumper</p>	<p>Station #13 2475 Adriatic Avenue 1 – 1250 gpm Pumper</p>
<p>Station #4 411 Loma Avenue 1 – 1250 gpm Pumper 1 – -85' Aerial Ladder 1 – Paramedic Unit</p>	<p>Station #15 Pier C, Berth 22 1 – 4500 gpm – 56'6" Fireboat</p>
<p>Station #5 7575 E. Wardlow Road 1 – 1250 gpm Pumper</p>	<p>Station #16 3500 E. Wardlow Avenue 1 – 1250 gpm Pumper 1 – Twin Agent Quick Response Unit 1 – 4000 Gal. Crash Rig 1 – 1500 Gal. Crash Rig 1 – 1250 gpm Foam Unit</p>
<p>Station #6 835 Windham Avenue 1 – 1250 gpm Pumper</p>	<p>Station #17 2241 Argonne Avenue 1 – 1250 gpm Pumper</p>
<p>Station #7 2295 Elm Avenue 1 – 1250 gpm Pumper 1 – -90' Aerial Platform</p>	<p>Station 18 3361 Palo Verde Avenue 1 – 1250 gpm Pumper</p>
<p>Station #8 5365 E. Second Street 1 – 1250 gpm Pumper</p>	<p>Station #19 3559 Clark Avenue 1 – 1250 gpm Pumper 1 – -85' Aerial Ladder 1 – Paramedic Unit</p>
<p>Station #9 3917 Long Beach Boulevard 1 – 1250 gpm Pumper</p>	<p>Station #21 225 Marine Drive 1 – -750 gpm – 38' Fireboat</p>
<p>Station #10 1417 Peterson Avenue 1 – 1250 gpm Pumper</p>	<p>Station #22 6340 Atherton Street 1 – 1250 gpm Pumper</p>

---

Source: City of Long Beach Department of Fire, 1973-74 Annual Report (Long Beach, California, 1974).





# **EXISTING FIRE STATIONS**

PLATE 1

In 1973 the per capita fire loss was \$5.90, which is slightly higher than the average per capita loss for the preceding 5-year period. There were 10 fire casualties and 80 injuries attributable to fire during the 1973-74 fiscal year.<sup>1</sup> The number of responses by units of the Fire Department to fires and other emergencies has continued to increase over the years. The most dramatic increase in Fire Department responses have been for emergencies other than those caused by fires. This increase can be attributed to the fact that four Paramedic units, providing first aid rescue service to the community, were put into full service during the fiscal year.

#### Bureau of Technical Services

The Bureau of Technical Services is responsible for the maintenance and installation of telephones, radios, fire alarm boxes, alarm communications within the stations, and citywide cable system for the Fire Department.

#### Bureau of Fire Prevention

Scheduled inspections of public assemblages, institutions, hospitals, industrial plants, commercial plants, ships, hotels and many other facilities are carried out by the Bureau of Fire Prevention. Inspections and the enforcing of the codes and regulations of the State of California, County of Los Angeles and City of Long Beach are increasing markedly; with the advent of more high rise buildings and other major developments. The Bureau also investigates arson. For fire inspection purposes, all types of buildings and structures are classified by uses as follows:

- A – Public Assembly Facilities
- B – Lesser Public Assembly Facilities
- C – Schools
- D – Institutions
- E – Hazardous Operations

---

<sup>1</sup> City of Long Beach, Department of Fire, 1973-74 Annual Report (Long Beach, California, 1974).

F – Commercial Buildings of over 20,000 square feet or more than four stories in height.

G – Non-combustible storage facilities

H – Commercial Residential Buildings

I – Dwellings (including duplexes)

J – Garages, sheds, fences, tanks, etc.

During the 1973-74 fiscal year, 1,800 violations of the fire code were cited. The most frequently cited problems were the lack of proper extinguishers and the presence of combustible waste and dry vegetation.

### Bureau of Instruction

The third bureau within the Fire Department is the Bureau of Instruction. This Bureau is responsible for the education of all members of the Fire Department in the latest developments in the technology of the fire fighting profession.

### Types of Fires

#### Fires by Occupancy

Obviously, fires vary in terms of their potential threat to life and property. Generally speaking, the risk is higher as the occupancy increases and as the building size and value of contents become greater. While the potential risk is greater, the actual risk, as based upon the frequency of occurrence, is often less. Table 2 is a breakdown of fires by classification for the 1973-74 fiscal.

TABLE 2  
FIRES BY OCCUPANCY  
(Both In and Out of Buildings)

	2 <sup>nd</sup> Half '73	1 <sup>st</sup> Half '74	Total
Apartments	336	347	683
Dwellings	392	403	795
Hotels	8	6	14
Manufacturing Plants	18	38	56
Garage and Service Stations	7	1	8
Theaters	3	6	9
Schools	39	58	97
Hospitals	14	8	22

TABLE 2 (continued)

	2 <sup>nd</sup> Half '73	1 <sup>st</sup> Half '74	Total
Churches	12	7	19
Automobiles	426	381	807
Grass	226	238	464
Trash	434	469	903
Aircraft Crash	0	0	0
Aircraft Fires	4	7	11

Source: City of Long Beach Department of Fire, 1973-74 Annual Report (Long Beach, California, 1974).

### Fires by Cause

In any mechanized urban area there exists a great many potential causes of fire. Many of the causes are a result of human carelessness or mechanical failure that is difficult to predict and even harder to eliminate. In some instances, however, potential fire hazards can be removed if they are recognized as problems. Table 3 classifies the causes of fires for the 1973-74 fiscal year.

TABLE 3  
FIRES BY CAUSE

	2 <sup>nd</sup> Half '73	1 <sup>st</sup> Half '74	Total
Airplanes			
Crash	0	0	0
Emergency Landings	0	0	0
Miscellaneous	4	7	11
Arson <sup>1</sup>	199	175	374
Automobiles			
Accident	21	25	46
Backfire	66	19	85
Shorted Wiring	62	48	110
Miscellaneous	287	289	576
Burning, Illegal	6	0	6
Carelessness <sup>1</sup>			
Children, Matches, etc.	172	166	338
Cigarettes	135	118	253
Miscellaneous	32	28	60
Defective Chimneys			
Fireplaces	2	1	3
Vents	2	0	2
Electricity			
Dryer	4	3	7
Heater	3	1	4
Motor	29	20	49
Power Pole	14	9	23
Electricity (cont.)			
Refrigerator	6	2	8
Television	18	14	32
Washing Machine	4	7	11
Wiring	30	15	45
Miscellaneous	75	60	135
Explosion			
Flammable liquid vapors	2	0	2
Gases (natural, LPG, etc.	3	3	6
Miscellaneous	8	3	11
Fireworks	7	1	8
Flare Pots	1	0	1
Gas			

Source: City of Long Beach Department of Fire, 1973-74 Annual Report  
(Long Beach, California, 1974).

<sup>1</sup> The greatest single causes of fire are attributable to Arson (374) and carelessness (651)

TABLE 3 (continued)

	2 <sup>nd</sup> Half '73	1 <sup>st</sup> Half '74	Total
Dryers	11	10	21
Heaters (space, water, etc.)	5	4	9
Leak	20	15	35
Ignition			
Flammable liquid vapors	52	49	92
Gases	2	4	6
Hot Grease	40	39	79
Hot Tar	3	1	4
Spontaneous	2	2	4
Miscellaneous	8	3	11
Open Flame			
Candle	32	40	72
Torches	12	14	26
Rekindle	13	0	13
Sparks	7	5	12
Stoves and Furnaces			
Faulty	20	15	35
Food On	70	80	150
Overheated	4	1	5
Miscellaneous	8	10	18
Unclassified Known Cause	47	61	108
Suspicious	193	212	305
Undetermined	332	519	851
TOTALS:	2,025	2,097	4,122

It can be seen from this table that most fires are caused by arson and carelessness involving matches and cigarettes (aside from the Undetermined Cause category), and that other domestic-related causes also rank high. Catastrophic causes (explosion, crash, etc.) actually appear to be much more controllable in terms of prevention before they happen. This is important in constructing a land use strategy related to public safety because it adds perspective to the entire problem of fire causes.

### Fires by Zones

For dispatch purposes, the Fire Department has compartmented the City into zones. Information has been compiled for each of these zones, giving the number of fire incidents, and a number of non-fire incidents for the current year.

(See Table 4.) Plate 2 graphically delineates the number of fires by zones. Zone 17N, located just northeast of the downtown area recorded the largest number of fires (283). Nine other zones throughout the city showed a high incidence of fire, having over 100 in that past year. Generally, the older sector of the City, bounded by Willow Street on the north, Signal Hill on the northeast, Redondo Avenue on the east, the ocean on the south, and the Los Angeles River on the west had the greatest number of fire. The incidents of fire vary from zone to zone throughout north Long Beach. The fewest number of fires reported was in east Long Beach, where the structures are newer and where density is quite low.

Fire zones do not coincide with census boundaries or any other districts where precise demographic information is recorded and thus it would be difficult to determine the number of fires per capita or correlate fire incidents with population data. The raw data relating to the number of fires, as presented on Plate 2 does, however, give a general picture of fire occurrence throughout the City.





TABLE 4  
NUMBER OF FIRE, FALSE ALARM, FIRST  
AND NON-FIRE INCIDENTS BY ZONE

Zone	Number of Fire Incidents	Number of False Alarm Incidents	Number of First- Aid Incidents	Number of Non- Fire Incidents
10 C	8	8	11	9
10 N	4	1	7	5
10 S	53	1	6	4
11 C	7	10	12	20
11 N	29	13	33	42
11 S	23	9	40	10
12 C	139	71	551	85
12 E	67	28	220	42
12 W	117	34	259	69
13	114	33	301	38
14	89	37	245	36
15 N	128	29	156	53
15 S	64	10	48	16
16	156	33	352	92
17 N	283	53	373	66
17 S	143	47	262	52
35 N	99	12	112	34
35 S	29	9	47	13
20 E	88	41	282	68
20 W	73	34	233	48
21 N	51	11	114	82
22 S	59	10	151	153
22 E	16	13	50	44
22 S	10	3	20	13
22 W	40	10	93	35
23	13	1	7	1
24 E	22	5	23	12
24 W	24	8	30	11
25 E	115	41	218	54
25 N	22	12	65	10
25 W	87	21	199	36
26 N	73	17	119	92
26 S	67	14	110	36
49 W	38	8	56	22
27 S	22	5	31	19
49 E	35	2	37	20
28 S	31	9	34	21
30 N	74	18	123	43
19 W	77	17	190	28
31 N	34	1	24	10
19 E	16	3	25	7
32 N	61	13	113	43
32 S	30	11	60	25
32 W	24	6	9	11

TABLE 4 (continued)

Zone	Number of Fire Incidents	Number of False Alarm Incidents	Number of First- Aid Incidents	Number of Non- Fire Incidents
33 N	37	18	86	37
33 S	19	5	68	28
34 E	198	21	169	26
34 W	85	29	214	37
36	93	23	132	51
37 E	68	10	163	44
37 N	46	8	81	39
37 W	116	24	273	48
38 N	60	7	85	19
38 S	65	10	65	16
40 C	0	0	0	1
40 E	45	8	64	54
40 W	9	4	8	7
41 E	18	2	10	4
41 N	10	2	25	6
41 S	24	8	54	8
42	30	8	46	21
43 E	23	2	17	8
43 N	23	6	12	18
43 S	4	0	1	1
44 N	1	1	3	0
44 S	13	5	9	156
45 N	34	9	48	16
45 S	20	5	20	14
46 N	30	9	45	13
46 S	34	5	38	24
47 N	39	5	51	64
47 S	43	8	46	21
48				

Source: City of Long Beach Fire Department.

#### Hazard Areas:

As a part of the “station relocater program” (to be discussed later) the Long Beach Fire Department has identified fire hazard areas throughout the City. Classifications were established as “Most Critical,” “Critical,” and “Least Critical.” Criteria for each of the categories are as follow:

Most Critical

High-rise

Shopping Centers

Hospitals, Convalescent homes

Dense life hazard concentrations, concentrations of combustibles  
(tenements, etc.)

Public assembly (including older 2 story schools)

Hazardous industry

Storage warehouses/areas (tank farms, lumber yards, etc.)

Inaccessible properties

Critical

Multiple dwellings

Accumulation of small businesses

Mixed occupancies (residences, manufacturing, etc.)

2 to 3 story wood frame buildings

Small manufacturing

Manufacturing for non-hazardous products

Sales rooms, car lots

Railroad and wharf property

Schools

Least Critical

Residential

Plate 3 shows what areas of the City fall within each of the three categories.

#### Factors Affecting Fire Potential

One obvious factor that relates to fire hazard is the age and condition of structures. As indicated on the fire zone map (Plate 2) and the fire hazard map (Plate 3), the area of greatest concern in the City includes downtown and its periphery. This area has the greatest percentage of old and deteriorated structures, reflecting environmental and social problems often common to older neighborhoods. (See Plates 4, 5, and 6.) An earlier study reported: "The deterioration of this area has been hastened by the continual increase of low-

income elderly and young transient population which has spurred the demand for the conversion of older homes into boarding houses or apartment unites”<sup>2</sup>

Land use is another factor, which greatly affects fire potential. Industrial and commercial areas having high concentrations of people pose fire threats of some magnitude. It is imperative that adequate preventive measure be taken and that fire alarm response be at its best in such higher life-hazard areas.

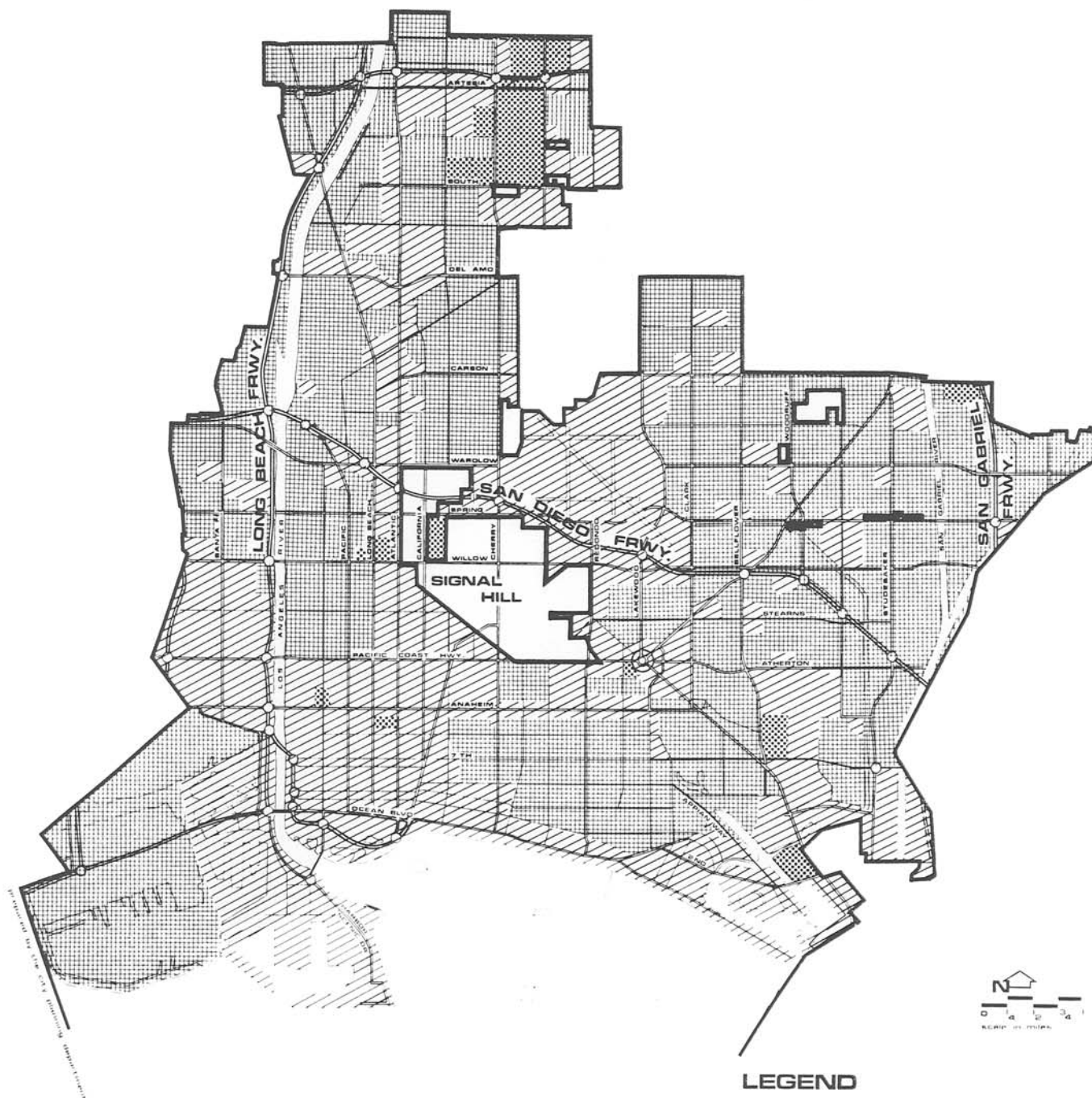
#### Insurance Services Rating for Long Beach

The Insurance Services Office conducts a municipal survey and ranks cities as to their degree of fire safety. Both the City as a whole and its Fire Department are evaluated and rated. The Long Beach Fire Department is one of only a few in the United States to receive a class one rating. Furthermore, the City itself is very close to a class one rating. Long Beach is categorized as class IIA, which is the highest rating attained by any city in the Country. Cities are evaluated in terms of deficiency points and are then assigned a class ranking between 1 and 10 (Table 5 shows the spectrum of classes and corresponding deficiency point system.) The smaller the number the better the rating. Long Beach received a total of 600 deficiency points, making it only 100 points from a class one rating. In the entire history of fire ratings, no city has ever achieved a class one status. By making necessary improvements and expenditures, Long Beach is hopeful of reaching this classification in the next evaluation.

In determining a city's fire protection rating, the Insurance Services Office produces a report evaluating various factors. Many of its findings are significant in terms of public safety. The following informational factors are noteworthy and are discussed in detail below. Recommended actions are those of the Insurance Services Office.

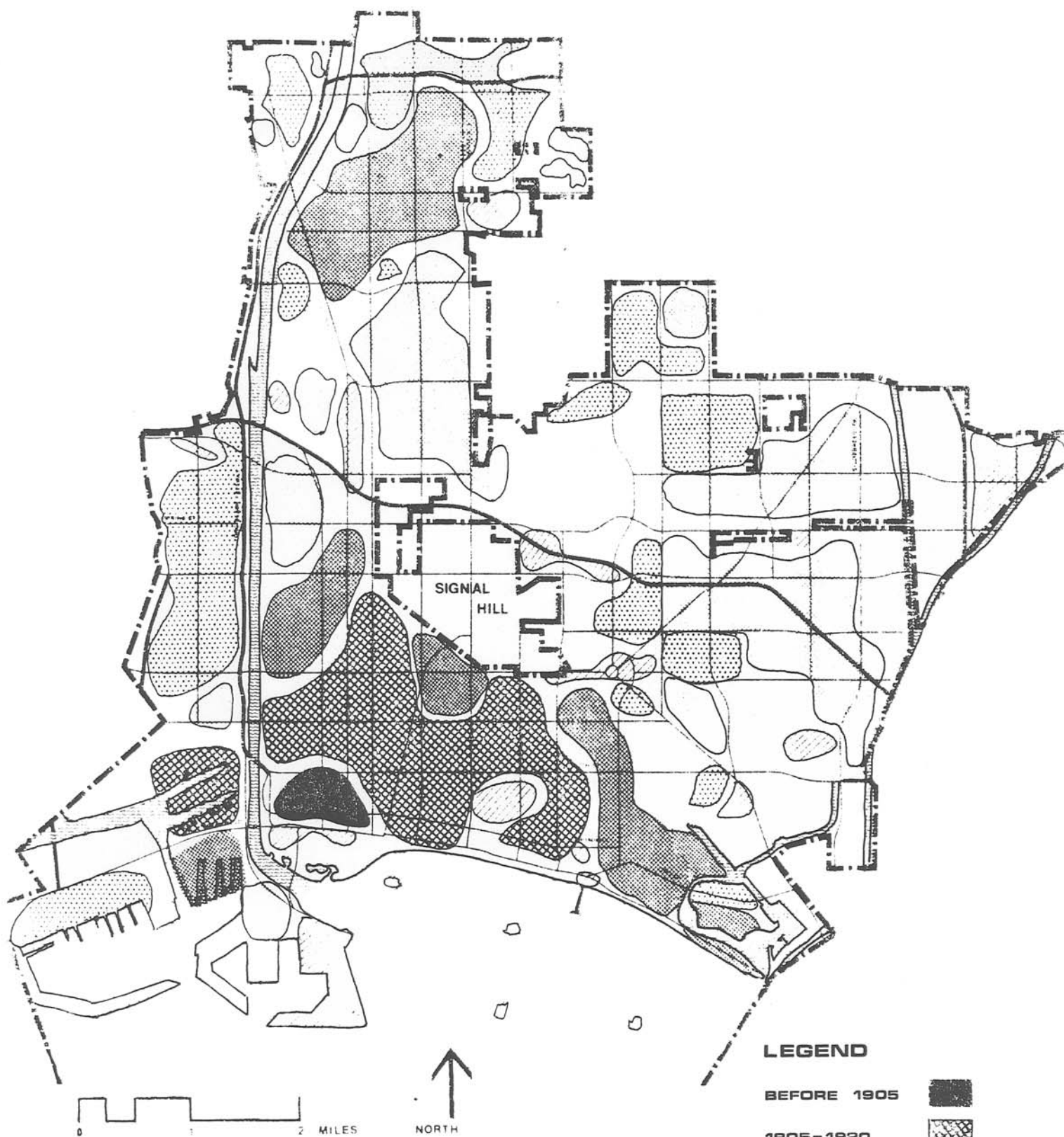
---

<sup>2</sup> Gruen Associates, Development Research Associates, and City CAP Staff, Long Beach CAP Survey and Analysis Report (Long Beach, California, 1972), pp. 1:25



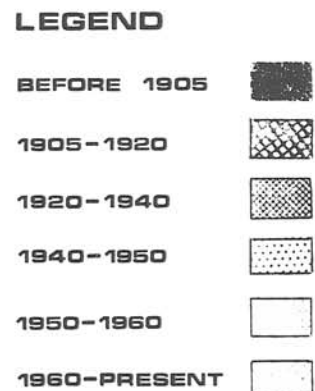
# **FIRE HAZARD AREAS**

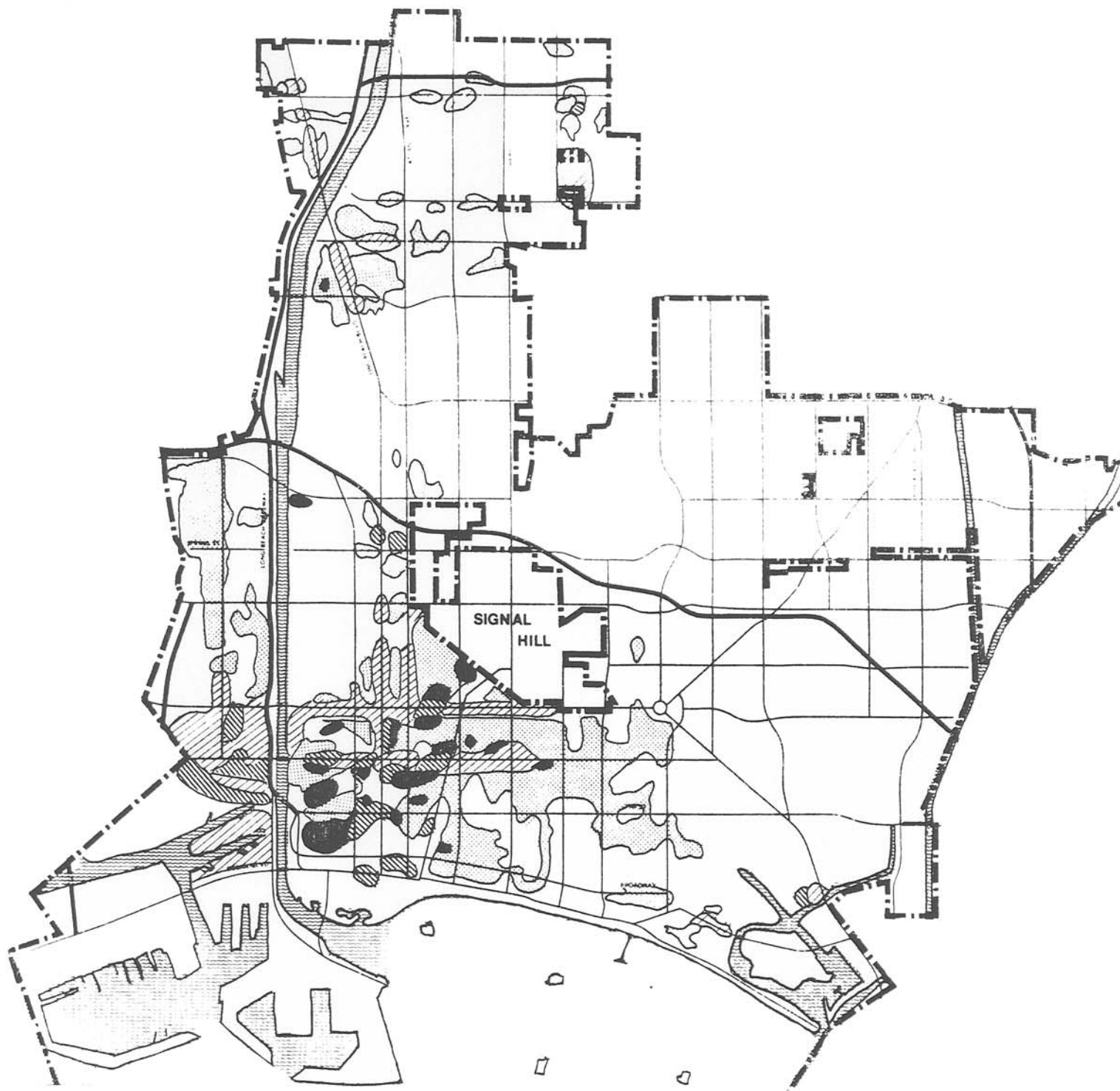
PLATE 3



# **BUILDING AGE**

PLATE 4





## LEGEND

RESIDENTIAL	20% OR MORE DETERIORATED	
RESIDENTIAL	20% OR MORE DILAPIDATED	
NON-RESIDENTIAL	20% OR MORE DETERIORATED	
NON-RESIDENTIAL	20% OR MORE DILAPIDATED	

## BUILDING CONDITION

PLATE 5

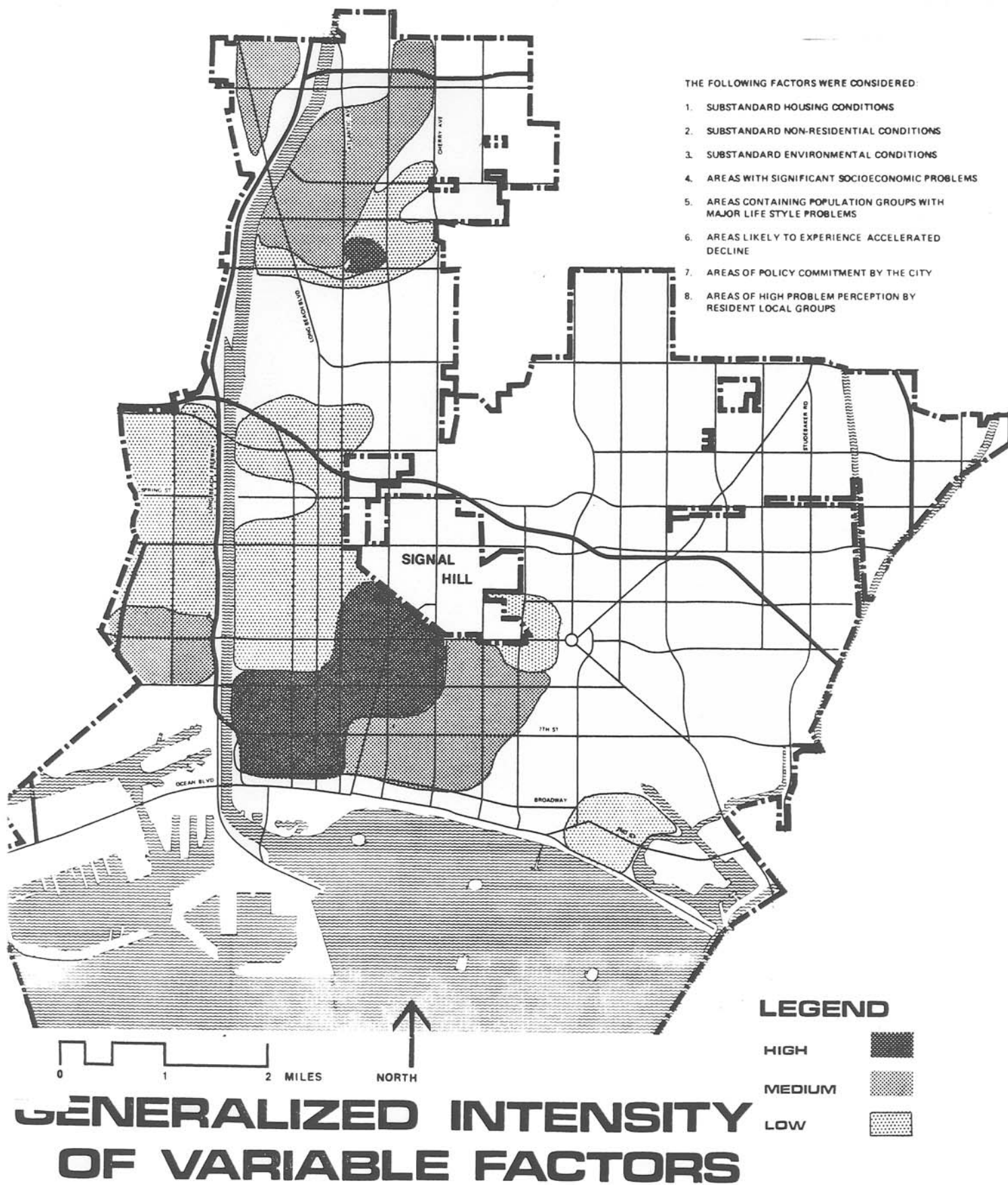


PLATE 6



TABLE 5  
FIRE RATING SURVEY FOR LONG BEACH, 1973

	Water Supply	Fire Dept.	Fire Serv. Comm	Fire Safety Control	Clim. Cond.	Diver- gence	Total Points	Clas s
Points of Deficiency	98	178	46	152	126	0	600	2nd

THE CLASS OF A MUNICIPALITY IS BASED ON A TOTAL MAXIMUM OF 5000  
POINTS OF DEFICIENCY AS FOLLOWS:

- 1<sup>ST</sup> CLASS, 0 TO 500 POINTS
- 2<sup>ND</sup> CLASS, 501 TO 1000 POINTS
- 3<sup>RD</sup> CLASS, 1001 TO 1500 POINTS
- 4<sup>TH</sup> CLASS, 1501 TO 2000 POINTS
- 5<sup>TH</sup> CLASS, 2001 TO 2500 POINTS
- 6<sup>TH</sup> CLASS, 2501 TO 3000 POINTS
- 7<sup>TH</sup> CLASS, 3001 TO 3500 POINTS
- 8<sup>TH</sup> CLASS, 3501 TO 4000 POINTS
- 9<sup>TH</sup> CLASS, 4001 TO 4500 POINTS
- 10<sup>TH</sup> CLASS, OVER 4500 POINTS

RELATIVE VALUES

WATER SUPPLY.....	1950
FIRE DEPARTMENT.....	1950
FIRE SERVICE COMMUNICATIONS.....	450
FIRE SAFETY CONTROL.....	<u>650</u>
	5000

Source: Insurance Services Office, Municipal Survey of Long Beach, California (Long Beach, California, June 1973).

### Water Supply

The majority of the City is served by the municipal water system. A residential area in the northwestern sector of the City is served by the Dominguez Water Corporation and another small residential area in the northeastern part of Long Beach is served by the Southern California Water Company. The Harbor District is served by the Port of Long Beach. The municipal system is backed up by reservoirs at two different locations. Combined, these reservoirs have a capacity of 116.96 million gallons. Throughout the City there are 6,142 hydrants. Hydrant spacing is mainly good\*

in commercial districts and fairly good\* in residential districts. The hydrants are mainly adequate\* in size and are in generally good condition.<sup>3</sup>

Fire flow tests show that water pressure and supply is good, with the exception of one spot location where the quantity is slightly deficient. Overall, the water supply is quite good and received only 98 points of deficiency out of a possible 1950 from the Insurance Services Office. The water Department was one of the few Departments in the United States to be rated as Class I.

### Equipment and Training

The survey indicates that the Fire Department has an adequate number of engine and fireboat companies but recommends two additional ladder companies. All other equipment is rated as adequate in terms of amount and type. The training program and general department administration are both considered good.<sup>4</sup> The Fire Department as a whole received only 178 deficiency points out of a total possible of 1950.

### Communications

The fire alarm system is rated as reliable and well maintained. There are a total of 299 boxes in service throughout the City. These boxes are generally well distributed. It is recommended, however, that additional boxes be installed so that one will be visible from and be within 500 feet of every building in high-value districts. It is suggested that reliability of the communications system could also be improved by installing more sophisticated electronic devices. In terms of the dispatching procedures, it is recommended that at least one of the two alarm

---

<sup>3</sup> It is recommended by the Insurance Services Office, however, that hydrants be inspected semi-annually and that records of inspection, conditions, and repairs be maintained. Furthermore, additional hydrants should be installed so that each street intersection has a least one hydrant, with intermediate hydrants located no more than 300 feet apart in commercial districts or 500 feet apart in residential districts.

\*The terms "good," "fairly good," "mainly good," and "quite good" are descriptive phrases employed by the Insurance Services Office in completing their evaluations. In view of the City's classification, words such as "excellent" and "superior" might better reflect the prevailing conditions. While appropriate, the use of such superlatives was purposely avoided in an effort to directly reflect the actual language used in evaluating the City.

<sup>4</sup> The training facilities, however, could be expanded to include a fire building. Training activities could also be improved by conducting additional drills both during daylight hours and at night. In terms of manpower, it is recommended by the Insurance Services Office that each engine and ladder company have at least six members on duty at all times. This is considered standard manning.

operators be on duty at all times. Overall, the fire safety communications are considered good, receiving only 46 deficiency points out of a possible 450.

### Fire Prevention

Fire prevention laws and regulations at the State and local levels are considered adequate. Hazardous fire conditions are well controlled via the permit issuance program and the business licenses approval required by the Fire Prevention Bureau. Special permits are required for most hazardous materials and processes, and all business license applications must be filed annually and approved by the Fire Prevention Bureau.

In terms of codes, the City is fairly well protected. The City has adopted the 1971 edition of the Uniform Fire Code with additions<sup>5</sup> The Uniform Plumbing Code was adopted by the City and contains good requirements for gas piping and gas appliances. Electrical regulations over new electrical installations are good. The City has adopted the 1971 edition of the National Electrical Code. One shortcoming in this area is that no regular program is set up for the inspection of old electrical work, and during recent inspections some poor conditions were noted. A 1970 edition of the Uniform Building Code has been adopted by the City with a number of amendments and additions. By the Insurance Services Office standards, the Building Code provisions are comprehensive, but are somewhat inadequate in areas pertaining to allowable areas, thickness of walls, and fire-resistance construction.

Aside from the municipal codes, the State Vehicle Code regulates the transportation of explosives and the State Fire Marshal regulates the transportation of flammable liquids. Specific routes of travel for transporting explosives are designated by the State Highway Patrol.

To further improve fire safety controls, the Insurance Service Office recommends more detailed pre-fire plan examinations. Furthermore, it is

---

<sup>5</sup> The City is now reviewing and preparing for the adoption of the 1973 Uniform Fire and Building Codes with Amendments; the 1973 Uniform Mechanical Code; and the 1973 Uniform Housing Code with Amendments. These later editions reflect current thinking in these fields and provide for additional fire protective measures, which will be discussed later in this document.

essential that complete inspections of old wiring be made and that defects be corrected. The survey suggests that a regular program for such electrical inspections should also be instituted.

A further measure of effectuating better fire prevention would be to amend the building code to include structural features necessary to provide life safety and to restrict the spread of fires. It is recommended by the Insurance Service Office that the National Building Code of the American Insurance Association be used as a guide in framing these amendments. Overall improvements in the fire safety control activities is perhaps the best opportunity the City has for improving its fire rating in that the City received 152 deficiency points out of a possible 650. Proportionately, more deficiency points were received in this area than in any of the other factors considered in the evaluation.

#### Land Use and Loss Potential

One objective in fire fighting is to contain a fire to its point of origin. Accomplishing this objective is, of course, dependent to a great extent upon the existing land use and structural type. As might be expected, the spreading of fires is probable where building are congested, and should be held to the area of origin where more space separates structures.

#### Commercial Districts

Large conflagrations are most likely to occur in the downtown business area because of building spacing and structural type and condition. Street widths and general accessibility is good, however, and its is unlikely that a fire would spread beyond the block of origin or cause a general conflagration to develop except possibly during a major earthquake. Commercial developments on the periphery of downtown consist of fairly well separated buildings and thus fires could most probably be contained to the structure of origin.

Smaller shopping centers and strip commercial developments are located throughout the City. Due to the spacing of most structures, fires could most likely be confined to the building of origin. Large fires could be expected, however, at

those locations having single, large area buildings where automatic sprinklers are not provided.

### Industrial Districts

The harbor district with numerous underground petroleum pipelines, oil terminals, and several tank farms presents a potential fire and explosion hazard to the City. A major earthquake could be catastrophic in this district if water service were disrupted and earthen dikes around tanks breached.

The McDonnell Douglas aircraft plant consists of some extremely large structures, but fires should be confined to the individual buildings of origin due to generally good spacing and sprinkler protection.

The area commonly referred to as the Westside Industrial Area consists primarily of small manufacturing concerns. The potential of block fires does exist in those areas where wood frame construction and poor building separation exists. In most instances, however, fires should be confined to the building of small group of origin.

### Institutional Districts

California State University at Long Beach covers roughly 296 acres and consists of several buildings of varying heights. Fires should be confined to the building of origin in most instances except where wood frame covered walkways are constructed between structures.

Veterans and Memorial Hospitals are the largest in the City and both are constructed with fire-resistive materials. Generally the fire protection features are good at the hospitals.

When the Queen Mary was permanently docked off Pier J many fire safety features were installed as part of the ship's remodeling so as to minimize the hazard from fire. This included the installation of a fire detection system and sprinklers.

## Residential Districts

In most instances, residential fires could be confined to the building of origin. This is particularly true in areas where single-family dwellings predominate. In more densely developed residential areas, such as the area east of the downtown business district, block fires are more possible. In congested areas, fires could be expected to spread to neighboring buildings.

## Existing and Proposed Fire Stations

Fire Department officials find it necessary to continually re-evaluate plans to meet fire protection needs resulting from changing conditions within the community. Factors such as annexations, changing of building designs and construction, building deterioration, zoning changes and possible contracting for fire and rescue services with neighboring jurisdictions all add to the complexity of planning adequate fire protection. To coordinate these factors, the Fire Department has completely re-evaluated all sites for fire stations in an effort to achieve maximum efficiency in their operations. The Department has worked with Public Technology, Inc. in developing a more sophisticated system of locating stations, as based upon fire demand zones. As part of this systematic evaluation, travel distances were measured by computer processing techniques.

This innovative approach to determining fire station locations involves a process of identifying fire demand zones. The focal point of these zones consists of large concentrations of people or major industrial or commercial establishments. Desirable travel times are then determined for each of the focal points. A list of all existing stations is then fed into the computer, which will provide the estimated travel times from the nearest station to each of the fire demand zone's focal points. The desired response time can then be compared to the existing travel times from the existing fire stations as they are now located. Next, a list of all potential future fire station sites are fed into the computer and again response times are established for each of the focal points in the City. The outcome of this program is a set of ideal station locations. These ideal sites can then be compared to the existing situation in determining where to relocate

stations or build new ones. "In summary, this program represents an effort to reduce the cost of comprehensive fire protection to an absolute minimum and to make the most effective use of fire suppression manpower and equipment."<sup>6</sup>

While this program is promising in terms of improving fire protection in Long Beach, it should be kept in mind that the process of extinguishing a fire involves a number of separate but related factors. Once a fire starts, it takes time before it is detected, time to call the Fire Department, time to dispatch the fire fighting company, time to travel to the location of the fire, and time to set up the equipment and prepare to fight the fire. The above mentioned station locator program would only affect the travel time between the stations and the fire demand zones throughout the City. It would not affect the other variables involved. Nonetheless, the importance of station locations cannot be overstated.

As a result of this extensive Fire Station locator program, the Long Beach City Council is now considering the appropriation of over five million dollars to be spent over the next five-year period for the relocation of several fire stations. The program is an alternative, which calls for greater immediate capital expenditures, with a long-term savings in manpower and equipment costs. The bulk of the program is to be implemented over a two-year period, reflecting priorities. While the specific sites have not been selected, tentative locations and relocations for fire stations are as follows:

- Phase I: Relocation of fire stations 2 and 10 in the general vicinity of 8<sup>th</sup> Street and California and in the southeastern section of Long Beach; and relocation of fire stations 3 and 15 and Fireboat 21.
- Phase II: Relocation of fire stations 9, 12, 13, and construction of a new station #14; together with two internal truck company moves to provide a more proper distribution of fire fighting equipment.

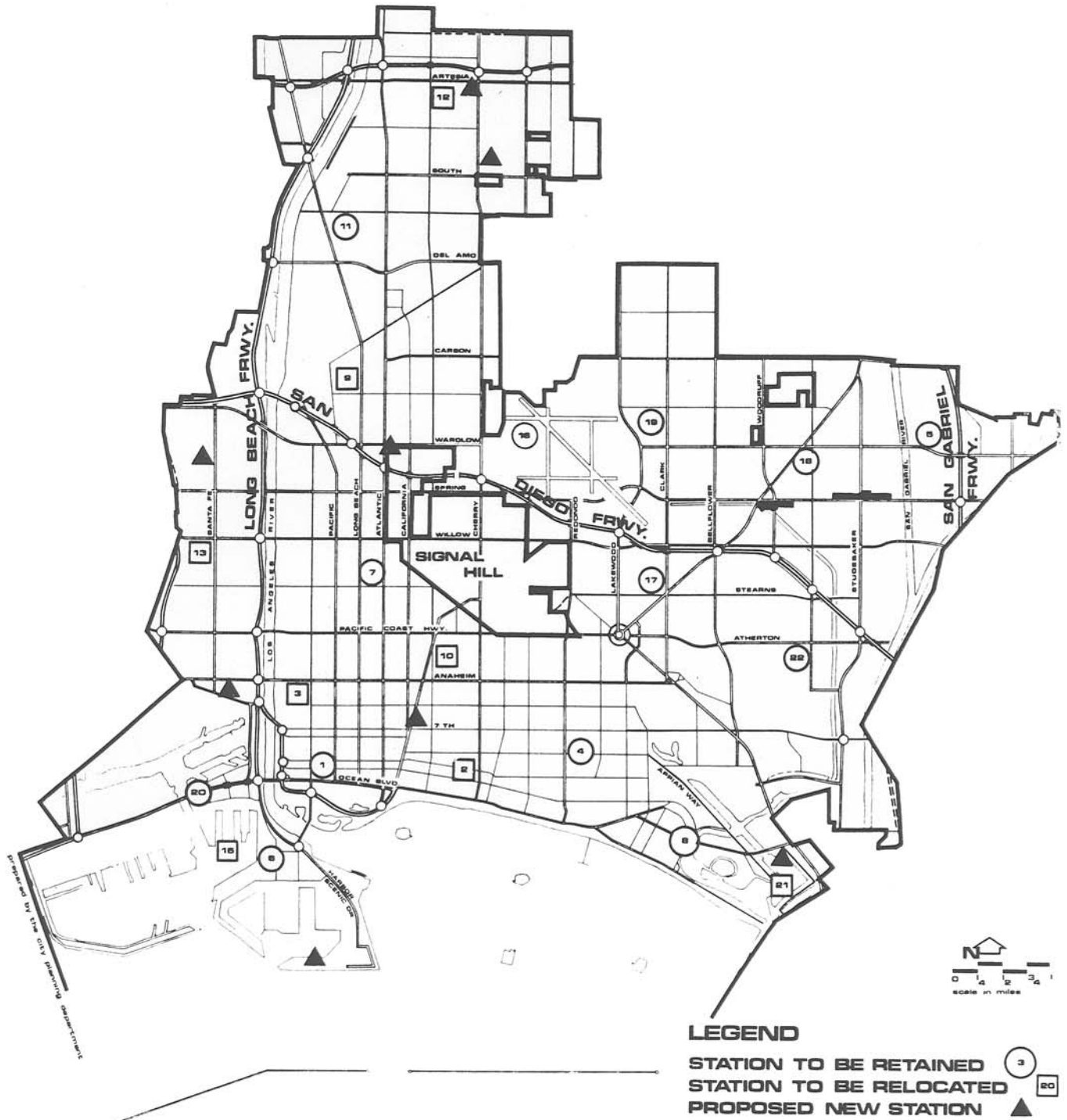
Currently there are 18 regular fire stations and three fireboat facilities. Implementation of both phases of the new fire station locator program would result in the closing of 8 existing stations and the construction of 8 new facilities.

---

<sup>6</sup> Fales, James M. Jr., "Fire Station Locations," Public Management (August 1973), p.9.

(See Plate 7.) As the total number of stations will remain constant, additional expenditures for manpower and new equipment will be minimized. If implemented, the plan is expected to provide the City with comprehensive fire protection for the next ten to fifteen years.





# **FIRE STATION LOCATIONS**

### Station Location Factors

In selecting specific sites for new stations, numerous factors must be weighed and considered. Over the years, the American Insurance Association (AIA) has established standards for the location of fire stations. These standards (which are discussed in the following paragraphs) are generalized and should be considered only as guidelines for fire station locations. It must be noted that each potential site has varying characteristics and no two locations can be similarly compared. As future sites are projected for construction, the total area requiring protection must be considered. The anticipated type of development in the area will help in determining the extensiveness of the fire defenses.

### Land Use Factors

One of the most important factors in locating fire stations is the type of area to be protected. This means whether an area is used primarily as business, industrial warehouse, institutional, residential, or a combination of uses. Stations should be near extensive industrial or business districts and near areas where there is a high life hazard. This is important even though such a decision appears to be out of line with a plan of uniform fire defense distribution.

Concerning high value districts (areas of intensive commercial and office development), enough stations should be provided so that no point will be more than one mile travel distance from an engine company or 1.25 miles travel distance from a ladder company. This distribution should also allow for ready concentration of companies to multiple alarm fires in any high value area. Such a procedure should be developed so that other sections of the City are not stripped of protection in the event of a second fire.

In average residential areas (generally single family development) of the community, service radius may be increased up to two miles for engine companies and three miles for ladder companies. In residential areas where densities are higher or where building are three or more stories in height; the

distances should be reduced to one and one-half miles and two miles, respectively.

It is important to note that the Station Locator program measures distances in terms of travel time rather than in terms of travel distance. The above-indicated guidelines are included here for comparison purposes in that the standards should reflect relative consistency. In other words, proposed fire station locations should meet or approximate the established standards of desired travel times as well as travel distances.

### Topography and Geography

Topographical characteristics also affect the station location and the total number required. For example, a location on a hillside or at the bottom of the hill is not satisfactory when many responses must be made up grade. As Long Beach is relatively flat, this is a less important factor here than it might be elsewhere in Southern California.

### Traffic and Circulation Factors

In situations relating to heavily traveled streets, a station may be positioned on a parallel street or a cross street with traffic lights at the nearby intersection arranged for control from the station. This permits response across or onto the heavily traveled street. One-way streets pose another problem, which may be resolved by traffic lights controlled from the station. Generally, a site at an intersection is good since it permits response in more than two directions.

### Site Requirements

Stations should be set well back from the curb line, especially where the street is narrow. The lot should be of ample size so as to provide adequate parking facilities for employee autos, to assure enough area for conduction company drills, and to allow for any necessary expansion of the physical plant.

Generally, the maximum building coverage should not exceed 25 percent of the site area.

### New Fire Stations

There are no precise standards concerning the design of fire stations. Each facility must be examined as it relates to the surrounding area, which is to be served. Municipal officials should work with duly qualified personnel in preparing plans and specifications for fire station construction. Fire fighting personnel should be involved in developing the final plans as the operation and maintenance of the stations will ultimately be theirs. Plans for new stations should also be given to the local fire-rating bureau so that it might comment and make suggestions as to the adequacy of the proposed facility. It is important to note that modern fire stations should possess an architectural design, which will blend with the surrounding neighborhood. The interior design and the building architecture are also significant factors relating to the attitudes and morale of the members of each fire company.

Many of the above mentioned considerations have long been an integral part of the planning of fire stations in Long Beach for the past several years. With the prospects of a major fire station relocation program in the offing it is felt that particular attention should be directed to these factors.

### Codes and Standards

Building and maintenance codes have been with governments since the time of King Hammurabi of Babylon, c. 2100 B.C. Modern codes not only relate to fire safety, but pertain to other aspects of contemporary living as well. Minimum housing codes, electrical codes, plumbing codes are a few of the most common. From the standpoint of fire safety, building codes and fire prevention codes are the most important. "A building code, of course, applies principally to new construction and alterations, though it is sometimes made retroactive and applied to existing buildings if past deficiencies are discovered to be critical. Once a building is constructed, a fire prevention code may govern the

maintenance of the building and the introduction of materials into the building for the safe of fire safety.”<sup>7</sup>

### High-Rise Structures

The lack of developable land and the desire to live in close proximity to natural and man-made amenities has perpetuated an increasing trend toward high-rise construction. This trend is often justified from the viewpoint of economics and life style. The movement has, however, raised issues relating to public safety. Such structures generally depend upon internal support systems, such as air conditioning, water pressure, elevators, and communications. These support systems could fail in times of emergency, leaving inhabitants stranded. In many cities, outside assistance is often difficult or nearly impossible to provide inasmuch as most fire department capabilities are inadequate to meet the need.

There is increasing evidence substantiating the need for built-in fire protection measure in high-rise buildings. Without such protective devices, there is a level of risk beyond which a fire department cannot be expected to operate at maximum levels. From the cost standpoint, it becomes a matter of who shall bear the expense of adequate fire protection to meet normal needs. “Above that anticipated level of fire risk, built-in protection should be provided by the private sector.”<sup>8</sup>

Much of Long Beach’s future development is expected to consist of recycled land use; that is, land being redeveloped at a greater intensity of use than it previously had.<sup>9</sup> Some of this recycling could manifest itself in high-rise development, particularly in the downtown area. In an effort to provide better fire safety to citizens, the City’s Fire Safety Building Code Committee has proposed various ordinance changes, which were considered necessary to provide a reasonable degree of safety to occupants of buildings in the City. These

---

<sup>7</sup> National Commission on Fire Prevention and Control, American Burning. (U.S. Government Printing Office, Washington, D.C. 1973), p.80.

<sup>8</sup> Fire Engineering Magazine, “Master Fire Protection Plan,” Fire Engineering, (July, 1973), p.39

<sup>9</sup> See Population and Growth Paper of the Long Beach General Plan for a more detailed discussion of the recycling process.

recommended changes have been incorporated into a proposed package of 1973 Uniform Codes, which will be considered by the City Council in the near future. The special requirements are consistent with recommendations set forth by the International Conference of Building Officials and the National Commission of Fire Prevention and Control.<sup>10</sup> As spelled out in the proposed codes, these requirements would apply to structures having floors used for human occupancy located more than 55 feet above the lowest level of fire Department vehicle access.<sup>11</sup> Generally, this would apply to buildings of 5 stories or more. The special requirements include fire alarm systems, fire detectors, voice communication systems, central fire control stations, smoke control systems, elevator specifications, standby power sources, seismic consideration, building exits, and fire sprinkler systems. In short, when a building is of such heights or where vehicular access is limited to the extent that external accessibility of fire fighting equipment is impossible, an internal protective mechanism must be provided.

### Open Stair Wells

Another special problem associated with fire safety is the matter of open stairwells, which allows smoke and fire to spread from floor to floor throughout a structure. Most buildings in Long Beach having open stairwells were constructed prior to 1933. The age of these structures makes the problem even more pressing. Roughly 200 of these hazardous structures are multi-storied hotels that have been converted to permanent residential facilities, housing poor and elderly populations. The problem has come into focus in recent years due to a number of major fires, which have occurred in these types of structures in the City of Los Angeles.

In view of the seriousness of the problem, special recommended provisions for stairway enclosures were set forth in the proposed 1973 Uniform

---

<sup>10</sup> National Commission on Fire Prevention and Control, op. cit. p. 83.

<sup>11</sup> State Law in the form of SB 941 mandates certain minimum life safety regulations covering new construction of buildings 75 feet in height. It was felt, however, by local fire protection personnel that the 55 foot limitation was necessary in Long Beach in the interest of life safety and excessive property damage.

Building Code. The provisions require existing buildings to meet fire prevention standards in regard to doors, openings and corridor walls, stairway enclosures, exits, stair construction, exterior stairways, fire escapes, exit signs, enclosure of vertical openings, and separation of occupancies.

While proposed regulations could present numerous social and economic ramifications involving the fair treatment of building owner, the potential need to relocate occupants, the preservation of a vibrant business community downtown and the need for an adequate tax base, the safety of citizens must be considered paramount.

### Dense Developments

The intensity of land use can present a fire safety problem similar to that of high-rise. The major difference is that an entire area of a city may be affected by over intensive land usage while the high-rise problem is somewhat isolated to a particular structure. Setback requirements, open space allowances, and adequate off-street parking facilities are three pertinent factors, which directly affect the intensity of land use. In Long Beach this is a problem in many of the areas zoned R-4. Sections of the City such as Belmont Shore and Naples also pose special problems due primarily to limited access. While zoning involves the consideration of numerous other factors, fire safety should be a major factor influencing any changes in the existing zoning regulations.

### Pre-Fire Preparation

By the very nature of an urban area, there are bound to be problems associated with the detection and quick extinguishment of a fire. Some of these problems are virtually unavoidable and/or cannot be eliminated. Acknowledging this fact, the fire department conducts pre-fire planning exercises. Firemen from the various districts survey their area of responsibility and identify any potential problems, which could hinder fire-fighting efforts. Specific hazard locations or structures are photographed and studied more closely.

The general layout of the area is reviewed, fire hydrant locations are identified, access is examined, and other special circumstances are considered. This practical approach allows the fire fighting crews to analyze anticipated difficulties and set forth alternative approaches for the circumvention of whatever obstacles may be present. This type of site-specific analysis is most often used for critical structures such as hospitals and nursing homes or in areas where the life-hazard rate is high due to the occupancy characteristics.



# **GEOLOGIC HAZARDS**



## V. GEOLOGIC HAZARDS

The most pervasive geologic hazard in Long Beach is that of an earthquake. Because of the magnitude and complexity of this single hazard, a separate element of the General Plan is being prepared regarding seismic safety. Consequently, seismic considerations are only briefly discussed in this chapter of the Safety Element. Other geologic hazards are also presented here and evaluated as to their potential threat.

### General Geology<sup>1</sup>

The City of Long Beach is located on the coastal margin of the Los Angeles Basin, which is underlain by over 15,000 feet of stratified sedimentary rocks of marine origin. This marine section is composed of interbedded units of sandstone, siltstone, and shale. The central portion of Long Beach has been elevated by regional uplift and local folding and faulting. The gap areas now occupied by the Los Angeles and San Gabriel Rivers represent filled channels, which were cut deeply into the marine sediments by ancestral rivers during the lower sea level stand of the last ice age in Late Pleistocene time. Over the last 10,000 to 15,000 years, the rivers have filled these channels to their present level with relatively unconsolidated sand, silt and gravel.

The above-mentioned subsurface geologic conditions reflect the physiographic features within the City of Long Beach, which can be separated into six rather distinct areas:

3. The row of low hills extending from Bixby Knolls southeasterly to Seal Beach and including Signal and Reservoir Hills;
1. The broad, slightly elevated marine terrace lying south of this row of hills;
2. The Los Angeles River flood plain, known as the Dominguez Gap, lying along the western side of Long Beach;

---

<sup>1</sup> Much of the following material is taken directly from the Seismic Safety Study, City of Long Beach, by Woodward-McNeill and Associates.

3. The San Gabriel River flood plain and channel, known as the Alamitos Gap, in the northeasterly portion of the city;
4. The alluvial plain lying to the north of Bixby Knolls and Signal Hill; and
5. The coastal area including the sea bluffs, beach and barrier bars across the gap areas.

This latter area along the seaward portions of the gap areas have been highly modified by dredging and landfill operations associated with construction of recreational and harbor facilities. The gap areas are of particular concern because of the large landfill areas and the shallow groundwater condition.

### Seismic Hazards

The two greatest seismic hazards are ground shaking and liquefaction. Of less likely occurrence are the threats of fault rupture, tsunamis and seiches. Flooding and slope instability, which can be triggered by an earthquake event, are discussed individually in this section.

In projecting future geologic hazards, the State Division of Mines and Geology forecasts earthquake shaking to be the single most significant threat. "Given a continuation of present conditions, it is estimated that losses due to earthquake shaking will total \$21 billion in California between 1970 and the year 2000."<sup>2</sup> Ground shaking can affect very large areas (up to 50,000 square miles or more) during a very large earthquake and is usually the greatest cause of damage, especially in urban areas. Structures of all types are susceptible to ground shaking, and most deaths resulting from earthquakes historically are a result of structural failure due to ground shaking. Structures most vulnerable to collapse and or damage are those, which do not comply with the provisions of the Field and Riley Acts of 1933. Like many cities, Long Beach has a special problem with respect to old, un-reinforced buildings. Many of the older sections of the City, particularly the downtown area and along the major corridors such as

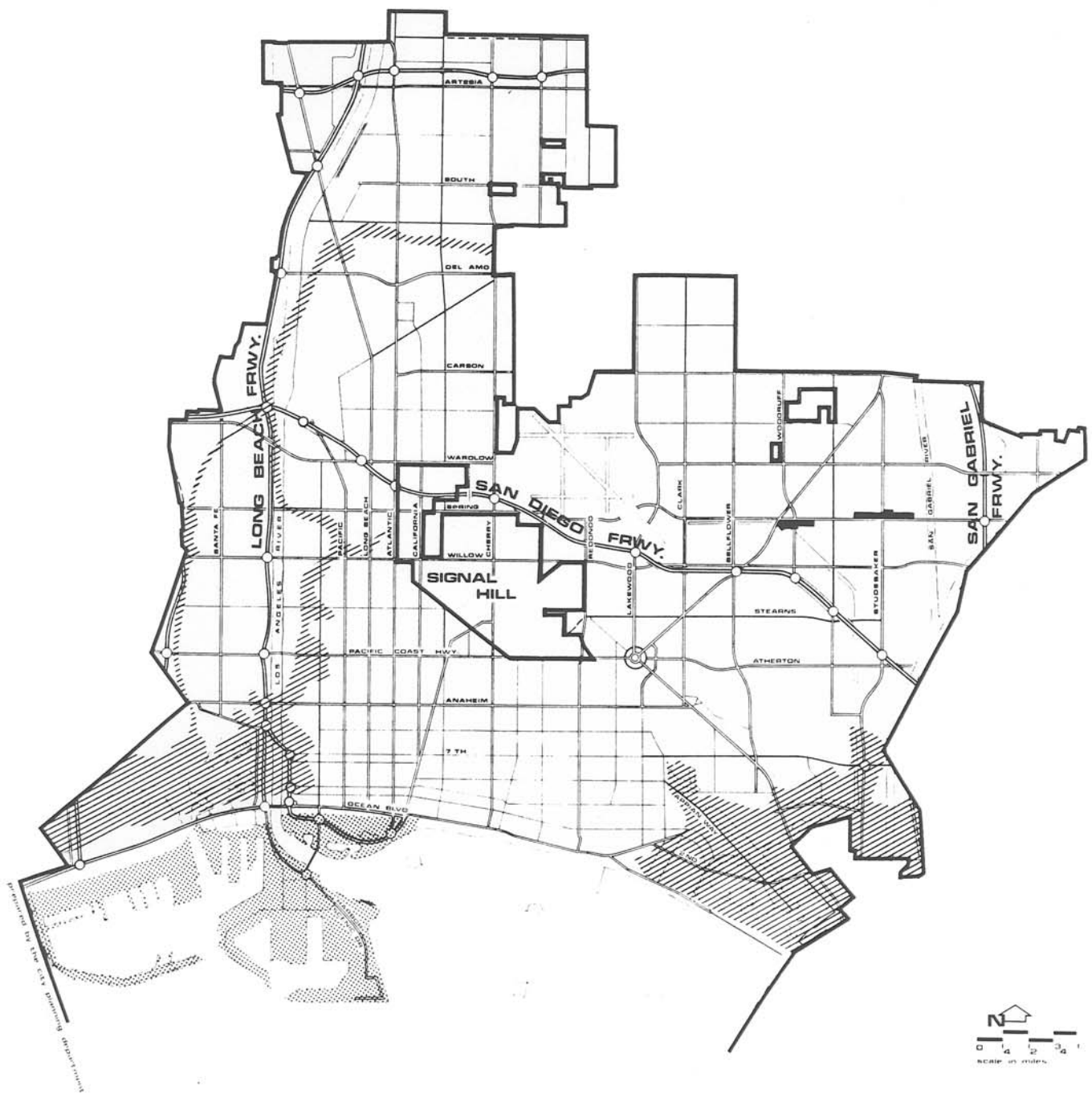
---

<sup>2</sup> California Division of Mines and Geology, Urban Geology Master Plan for California (Bulletin 198; Sacramento, California, 1973), p. 7.

Broadway, 4<sup>th</sup>, 7<sup>th</sup>, 10<sup>th</sup>, Anaheim, Atlantic, and Long Beach Boulevard have an abundance of such structures. A rational remedial measure for reducing the potential risk would be the rapid implementation of Subdivision 80 of the Long Beach Municipal Code. Subdivision 80 relates to the Rehabilitation of Pre-1933 buildings. Economically, such rehabilitation and renovation is expensive. For existing hazardous structures, the cost of remedial work can amount to a relatively large percentage of total value of an existing structure, and the benefit cost ratio, therefore, may be relatively small when considering property improvements for earthquake resistance. However, the social value in reduction to the threat of life loss justifies the existence of Subdivision 80. Furthermore, Subdivision 80 provides interim measures, which can be instituted to reduce occupancy and use of such buildings. As a means of expediting the removal of many of these building, numerous redevelopment projects are now being proposed and considered in and around the Long Beach central business district. Removal of existing unsafe structures can best be accomplished by replacing them with new developments. In this way the safety problems can be resolved without an adverse economic impact upon the City or property owners.

Liquefaction is essentially a phenomenon in which generally cohesionless soils become fluid and mobile. This process can occur instantaneously as a result of an earthquake, producing shear stresses that exceed the liquefaction strength of the soil. To have potential for liquefaction, three simultaneous conditions are necessary: a) generally cohesionless soils, b) high groundwater, and c) ground shaking. Cohesionless soils are often closely associated with marsh and fill areas. Plate 8 delineates the portions of Long Beach that were historic marsh areas and man-made fill areas. High groundwater levels, the second necessary condition for liquefaction, are shown in Plate 9. The third condition, ground shaking, is of course unpredictable with precision. While Plates 8 and 9 provide indications of areas, which may be subject to potential liquefaction, more detailed and precise information will be available in the Seismic Safety Element.

By comparison to ground shaking, liquefaction has historically produced less damage than structural response to ground shaking. However, in areas that may be subject to the occurrence of liquefaction, the sudden loss potential may be greater than for earth shaking. As liquefaction is a phenomenon that occurs at shallow depths, it is possible to reduce the hazards by use of various geologic techniques and structural design measures.

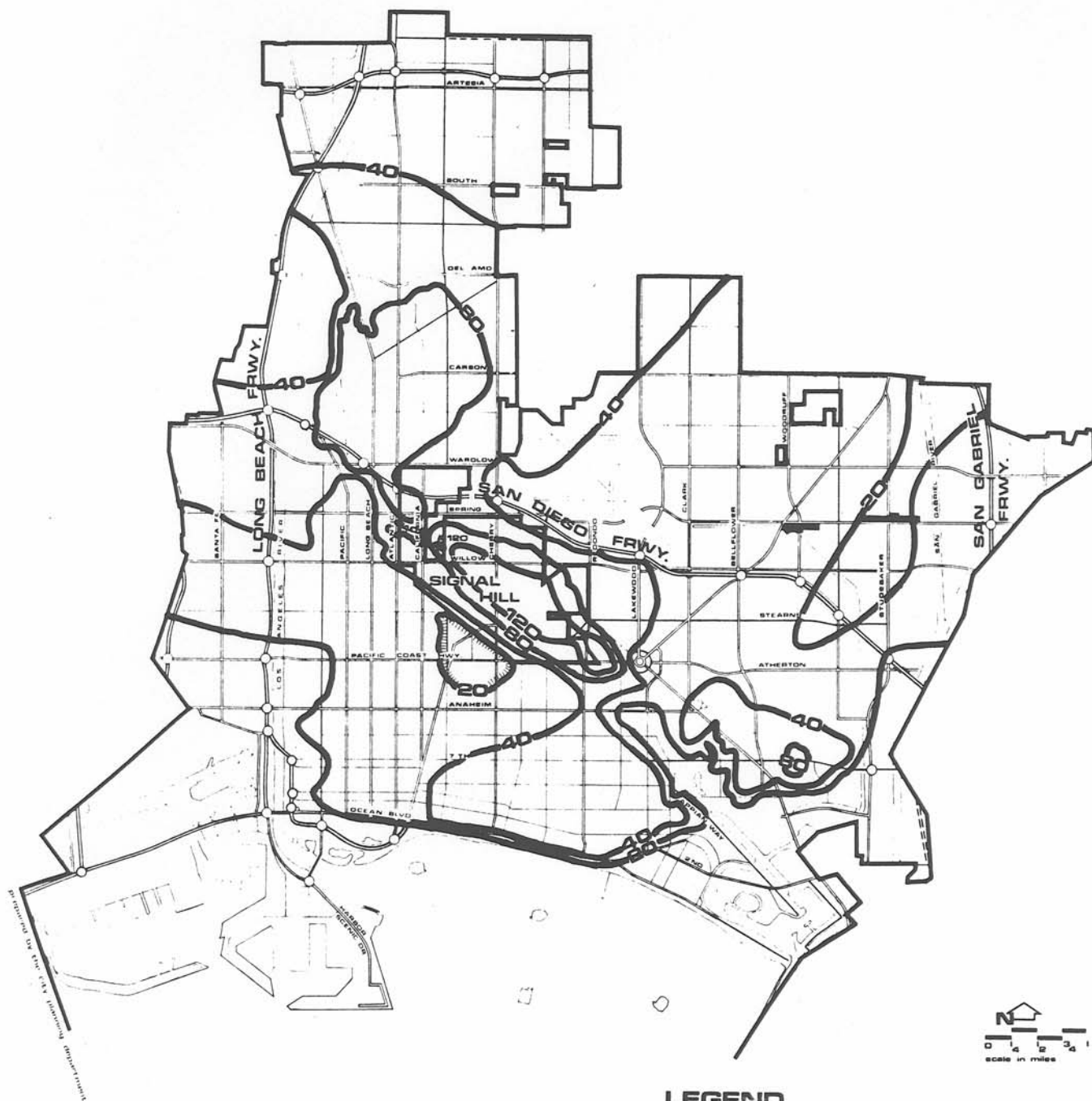


#### LEGEND

- HISTORIC MARSH AREAS (MOSTLY FILLED)
- MAN-MADE FILL AREAS

## MARSH AND FILL AREAS

PLATE 8



# **LEGEND**

**CONTOURS IN FEET  
BELOW GROUND SURFACE**

## **GROUNDWATER      CONTOURS**

PLATE 9



Fault rupture or displacement is most likely to occur along an existing fault. The only major active fault in Long Beach is the Newport-Inglewood system, which runs diagonally through the City. A fault rupture is not a necessary consequence of an earthquake and in the case of the Newport-Inglewood system; there is no direct evidence of surface displacement in the last 10,000 years. While the resultant damage could be quite severe, the potential for such fault rupture is considered to be less than the potential for damaging ground shaking.

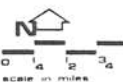
The faults of the Newport-Inglewood Zone which are believed to cut the surface or near-surface soils and the zone surrounding them have been defined. (See Plate 10.) These zones were established by defining a band, which extends one-eighth of a mile, or 660 feet, on each side of the approximate fault trace. These zones are believed to be adequate to encompass the area within which surface rupture would be most likely to occur for each identifiable fault. The zones are in accordance with the State of California guidelines for Special Studies Zones as specified by the Alquist-Priolo Geologic Hazards Zone Act. As a result of this Act, the State Geologist will map the Newport-Inglewood zone during the 1975/76 fiscal year. Prior to this action, the City's Seismic Safety Element will provide greater detail and set forth recommendations regarding the fault zone.

A tsunami is a sea wave usually generated by a large submarine earthquake. A seiche is similar to a tsunami, but is generated in an enclosed body of water such as a harbor, lake, or swimming pool. The potential damage, of course, is much greater from a tsunami than seiche. Tsunamis travel across the ocean as long, low waves.



#### LEGEND

NEWPORT INGLEWOOD FAULT ZONE  
 DASHED WHERE INFERRED  
 DOTTED WHERE CONCEALED  
 PRE-QUATERNARY BURIED FAULTS  
 LIMITS OF RECENT FLOOD PLAINS  
 BOUNDARY OF TERRACE DEPOSITS



## FAULT MAP OF LONG BEACH

PLATE 10

Traveling at almost 500 mph in the Pacific, such a wave in the open causes no problems, and, in fact, the slope of the wave front may be imperceptible to a ship at sea. However, as the tsunami approaches the coastline, it is affected by shallow bottom topography and the configuration of the coastline, which transform it into very high and potentially devastating waves. If large waves do not occur, strong currents can cause extensive damage. By comparison to many other areas of Southern California, Long Beach is somewhat protected by the surrounding geography and the breakwater. As a substantial warning time of perhaps as much as 6 to 12 hours would be anticipated, the potential for death or injury from a tsunami is not considered great. Substantial shoreline property damage would likely occur, however. Major damage would be to boats, harbor facilities and sea-front structures. In terms of probability, published estimates of recurrence intervals indicate maximum wave heights of 3 to 6 feet for 50 and 100-year recurrence intervals.

#### Mudslides and Landslides

Mudslides and landslides can be generally categorized under the heading of slope instability. Statewide, such slope instability is a major threat, estimated to cause nearly 10 billion dollars worth of damage between 1970 and the year 2000. The areas most susceptible to this condition are those where: a) slopes are steep, b) soils or soil lenses are weak, cohesionless, or not cemented, c) bedding dips out of the slope, and d) groundwater is present. In Long Beach slope instability is not a major problem as slopes generally are neither high nor steep. While slope instability is not a major consideration in overall land planning, it is a factor in designing individual sites. Chapter 70 of the Uniform Building Code relates to grading on sites where safety hazards may be created. As Chapter 70 has been adopted and is enforced in the City, slope instability is not a significant or imminent threat to public safety.

## Erosion

Like slope instability, erosion alone does not present any significant threat to public safety. Other beach communities throughout the State have a much bigger problem with this phenomenon. Due primarily to the breakwater, which protects the harbor and beach areas, erosion is a much lesser problem here.

## Flooding

A potential flooding hazard could be caused by two primary sources, rains or earthquakes. Flood control measures to cope with infrequent but intense rainfall have been taken throughout the entire Los Angeles Basin. These flood control activities are under the auspices of the Los Angeles County Flood Control District and the Corps of Engineers, which work in conjunction with local municipalities. Cities and counties must take certain measures to qualify for the National Flood Insurance Program of the Federal Department of Housing and Urban Development. As a part of this program, the City has delineated areas, which are subject to possible flooding on a 10-year recurrence probability (See Plate 11). In the designated areas, site-specific drainage considerations are reviewed prior to the approval of any construction.

The second potential source of flooding is earthquake related. Earthquake-induced flooding is the result of failure of water-retaining structures during earthquakes or especially high sea level fluctuations due to a tsunami or seiche. Structures involved in such potential flooding include dikes in the waterfront area and flood-control dams, which lie upstream from Long Beach. The former is expected to pose the most significant threat. Areas within 2 feet above mean sea level are considered most susceptible and areas over 2 feet above to 5 feet above mean sea level are considered secondary flooding zones. Precise topographic control is required to estimate flooding potential. Flood hazard areas, as identified in Plate 11, generally reflect the above-mentioned criteria.

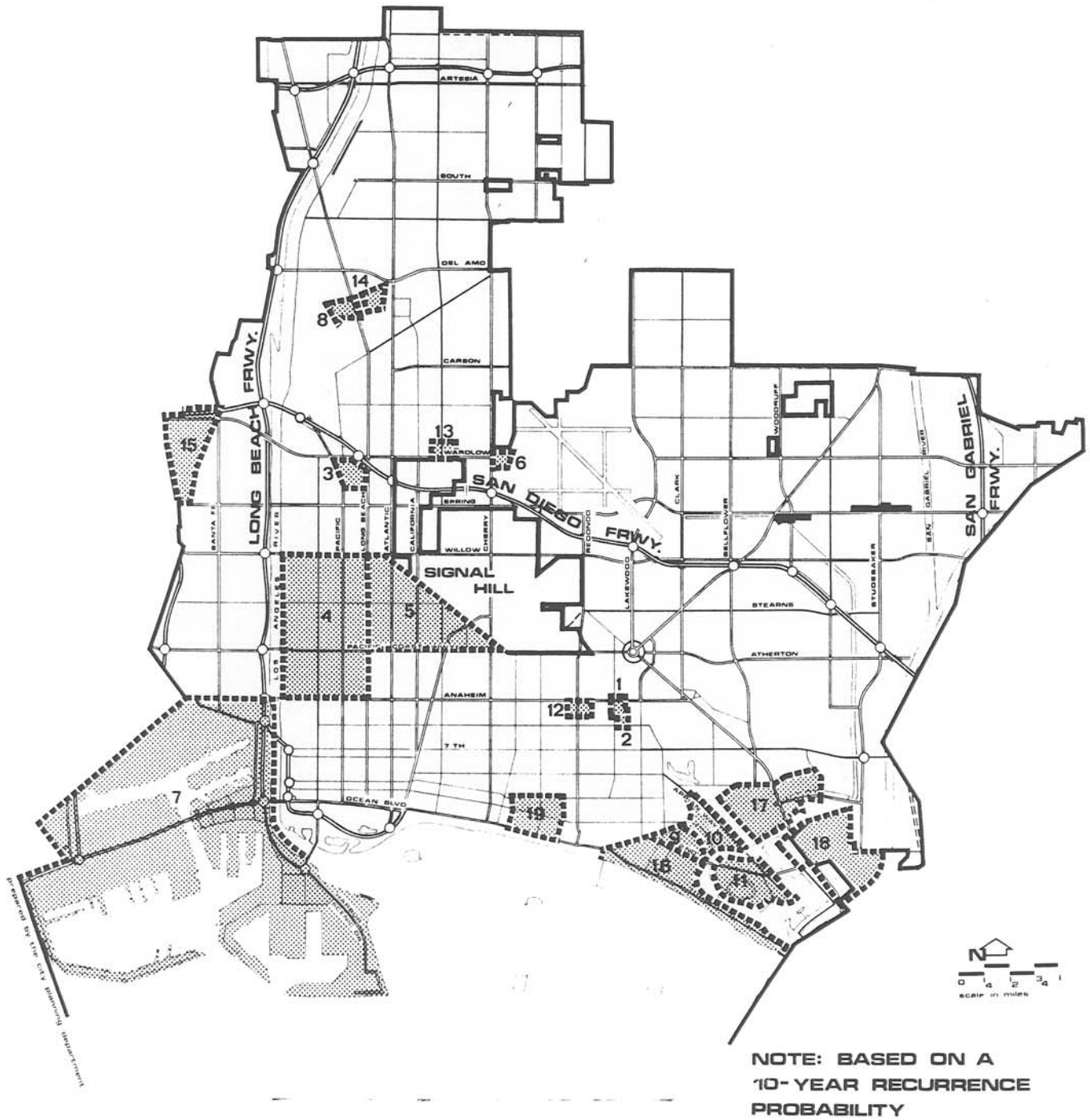
Three flood control dams lie upstream from the City: Sepulveda Basin, Hansen Basin, and Whittier Narrows Basin. The Sepulveda and Hansen Basins lie more than 30 miles upstream from where the Los Angeles River passes through the City. Due to the intervening low and flat ground and the distance involved, flood waters resulting from a dam failure at either of these reservoirs would be expected to dissipate before reaching Long Beach. In the event of failure of the Whittier Narrows Dam while full, flooding could occur along both sides of the San Gabriel River where it passes through Long Beach but would probably be most severe on the eastside of the river channel. Due to the infrequent periods of high precipitation and high river flow, the probability of flooding as a result of seismically induced failure of these structures is considered to be very low.

### Subsidence

There are four types of subsidence, based upon the following causative factors: groundwater withdrawal subsidence; hydro compaction subsidence; peat oxidation subsidence; and oil or gas withdrawal subsidence. The latter type has taken place extensively in the Long Beach Harbor area. At the center of the basin, subsidence amounted to as much as 30 feet at one time. To correct this problem, a full-scale water injection operation was initiated in 1958. Extensive repressurization of the reservoir through water injection has stabilized the area, which, along with substantial remedial land fill operations, has allowed continued use of port, petroleum production and commercial facilities.

This water injection program is now monitored by a network of 5 micro-earthquake monitoring stations that have been in operation since 1971. The primary purpose of the system, operated by the University of Southern California Geophysical Laboratory for the Long Beach Department of Oil Properties, is to detect possible low-energy seismic events induced by water injection. Apparently no such events have occurred during operation of the system. The monitoring system will be continued as long as oil extraction operations exist in the Wilmington Oil Field. Unless otherwise detected, it must be assumed that the

prevention measures of repressurization have alleviated the subsidence threat to public safety.



# **AREAS OF POTENTIAL FLOODING**

PLATE 11





# **CRIME PREVENTION**



## VI. CRIME PREVENTION

The major emphasis in this chapter will be on the matter of crime prevention through physical planning. Operational matters regarding specific programs or staffing will not be discussed at length as specialists within the Police Department can best address such subjects. Background information regarding the organizational framework of the Police Department and crime statistics is presented, however, so as to establish a better understanding of the existing status of law enforcement in Long Beach.

### Police and Society

As civilization developed and people began to live together in an organized fashion, the need for rules and regulations inevitably became apparent. Thus, laws were created establishing constraints upon individual freedoms for the mutual good and safety of all the people. The laws alone accomplished very little in the way of controlling anti-social behavior. The established laws needed to be enforced if they were to be effective. Thus, society created the policeman. Although the title was changed from time to time and from one geographical area to another, the "policeman" has been with us through all of civilization. The provision for law enforcement did not completely fulfill desires for order, harmony, and public safety, however. To accomplish criminal justice, impartial courts were needed to decide guilt or innocence and determine the penalties to be imposed upon offenders. This action, of course, created another problem: how does society handle offenders? Death, confinement, or other constraints upon individual freedom have been the general courses of action, the theory supposedly being that punishment of the offenders would teach them "right" from "wrong" and "good" from "bad." The severity of the punishment was determined by how much the offender needed to "learn." In recent years, modern society has emphasized rehabilitation rather than merely punishment for criminal offenders, although many do not hold to this view. Various preventative measures have also been recognized by society as a means of reorienting young people away from criminal tendencies. Improved

educational and employment opportunities exemplify such preventative and remedial strategies.

The above discussion was not intended to be a historical report on criminal justice. The intention was to establish to major points in regard to the role of police in society. First, it should be recognized that the need for law enforcement and safety from crime is as old as society itself. Secondly, the entire process of criminal justice and crime prevention involves more than just police. Crime as it relates to personal safety in urban areas, must include participation from various disciplinary fields as well as the citizenry at large.

#### Long Beach Police Department

The Long Beach Police Department has a current staff of 935 personnel. Of this number, 280 are classified as patrolmen. The complete breakdown of police department personnel by division is shown in Table 6. Overall, the police manpower per capita is 1.94 per 1000 population.<sup>1</sup> While this figure is lower than the national average, the west coast as a whole has traditionally maintained smaller law enforcement offices than many other portions of the nation.

TABLE 6  
POLICE DEPARTMENT PERSONNEL BY DIVISION, 1974

Division	Numerical Strength
Administration	95
Records Division	65
Jail Division	61
Communications Division	91
Vice Division	39
Juvenile Division	62
Detective Division	97
Traffic Division	146
Patrol Division	279
Watch No. 1    71	
Watch No. 2    75	
Watch No. 3   133	
Total Personnel	935 <sup>(1)</sup>

Source: City of Long Beach Police Department, Monthly Statistical Report (Long Beach, California, December, 1974).

<sup>(1)</sup> Of this total figure only 678 are sworn police personnel.

<sup>1</sup> This figure is based on the total number of sworn police personnel and the most current City Planning Department population estimates.

In terms of internal organization, Long Beach is undoubtedly rather typical in its division of labor and assignment of duties. The fact that all Police Department functions are located in one municipal building tends to facilitate communications and coordination of activities.

### Crime in Long Beach

Crime statistics are complex, confusing, and often misleading. In attempting to compare or analyze crime data, difficulties arise as a result of differences in reporting procedures, political boundaries, operational policies, population groupings and other factors. The F.B.I. annually publishes a "Uniform Crime Report for the United States." Being cognizant of the various factors which might lead to misinterpretation of statistics, the F.B.I. admonishes the reader against drawing conclusions from crime figures without first considering the factors involved. In any given area of consideration, various conditions exist which will affect the extent of crime and the type of crime that occurs. Some of the more significant conditions that affect crime include the following:

- Density and size of the community population;
- Economic status and values of the population;
- Age, sex, and ethnic composition of the population and the surrounding populations;
- Stability of the population;
- Educational, and cultural characteristics of the population;
- Effectiveness and strength of the police force;
- Attitude of the public toward law enforcement problems;
- Opportunity to successfully commit an offense.

All crimes are divided into two major categories entitled Part I and Part II. Part I consists of the most serious crimes including homicide, rape, robbery, assault, burglary, larceny, and auto theft. The Part II category includes such events as malicious mischief, suicide attempts, accidental injuries, accidental deaths, missing persons, and others. During the year of 1974, a total of 25,916

Part I offenses and 9,560 Part II offenses were committed in Long Beach. Of this total, 3,749 Part I, and, 3,671 Part II offenses were cleared by arrest.<sup>2</sup> The more serious Part I crimes not only present the greatest threat to the public safety from the standpoint of frequency of occurrence, but also pose the greatest problem in apprehension and arrest.

Part I crimes, which are of primary concern to the Police Department, are not increasing as rapidly in Long Beach as in many other cities throughout the nation. However, every effort is being made to provide sufficient forces, equipment and new techniques of police enforcement to cope with increased criminal activity. Table 7 shows a breakdown of Part I crimes for the years between 1967 and 1974.

The rate of criminal activity fluctuates throughout the City. Generally, violent and serious crimes have occurred more frequently in and surrounding the central business district (CBD), North Long Beach, and the area west of the Los Angeles River. In the CBD the socioeconomic status, particularly with respect to substantial transient movement, appears to have been a contributing factor to the rather high crime rate. This situation presents special problems for the City in protecting the many senior citizens living in the area. As in many lower socioeconomic neighborhoods of American cities, many permanent residents have problems caused by limited economic resources. Revitalization and renewal in this portion of the City should contribute positively to a deterrence of criminal activities.

North Long Beach as well as the area west of the Los Angeles River have experienced an increased crime rate of relatively recent origin. It is postulated that much of the increase in criminal activity is spillover from the neighboring cities to the north. This entire matter of spillover cannot be ignored. Past experiences of the Police Department indicate that activities in adjacent municipalities can have a substantial effect upon the crime rate of Long Beach.

---

<sup>2</sup> City of Long Beach, Police Department, Monthly Statistical Report (Long Beach, California, December, 1974).

For example, a 1972 Crime-Specific Burglary Program in the City of Bellflower, which consisted of a door-to-door campaign to inform citizens of burglary prevention techniques and devices, resulted in the apparent displacement of criminals to other communities. Residential burglaries in the City of Long Beach increased by over 20 percent in that year. While a minimal increase could have been anticipated, such a disproportionate increase can only be attributed to outside factors. The primary point to be made is that Long Beach cannot deal with the crime problem in isolation from neighboring communities within the Los Angeles Basin.

By contrast to the above-mentioned areas, east Long Beach, Bixby Knolls, the Harbor area, and most other portions of the City are experiencing an increase in crime against property as opposed to the more serious violation against persons.

#### Crime Prevention Through Physical Planning

Traditionally, crime has been viewed as a symptom of other factors, which needed to be corrected. Police personnel are almost solely involved in the apprehension of criminals and the suppression of crime. The matter of crime prevention was primarily limited to initiating social programs, rehabilitating offenders, tightening security and the like. Additional patrolmen would be added to a force, more sophisticated equipment utilized, and residents sometimes educated with regard to security hardware such as special locks and article identification. In terms of urban form and the quality of life in urbanized areas, this traditional approach has often resulted in the construction of fortresses, which isolated the residents from the surrounding community.

An example of this new lifestyle was presented by the National Commission of the Causes and Prevention of Violence: One new high cost subdivision under construction outside Washington, D.C. will be guarded by electronic alarms. The entire development will be surrounded by two fences, broken for entry at only two points, both with guardhouses. Residents will be telephone to approve visitors. The two miles of fencing will be surveyed by a closed

circuit television system and fortified by hidden electronic sensors. All residents will carry special credentials for identification.<sup>3</sup>

TABLE 7  
Part I CRIME RATE  
PER 100,000 POPULATION 1967-1972

Year	Total	Murder	Rape	Robbery	Aggravated Assault	Burglary	Larceny	Auto Theft
1967	3746	6.72	32.77	259.10	160.78	1558.8	2446.7	776.1
1968	4105	10.34	40.50	279.05	152.51	1677.6	2991.1	793.5
1969	4113	9.18	52.64	251.53	143.73	1625.1	2936.3	797.4
1970	4395	9.73	37.22	331.60	158.88	1797.5	3300.0	882.5
1971	4732	10.53	36.01	406.90	193.07	2000.8	3365.1	956.1
1972	5145	18.50	48.61	469.60	196.40	2214.3	2882.1	935.3
1973 <sup>(1)</sup>	6629	15.27	47.78	486.10	212.50	2183.8	2750.3	932.2
1974 <sup>(1)</sup>	7405	11.42	53.71	520.00	258.00	2326.6	3238.0	994.6

Source: City of Long Beach, Police Department

(1) Crime rates for 1973 and 1974 were computed on the basis of City Planning Department population estimates for those years

In view of the above-described dilemma, it has become increasingly apparent that the matter of crime prevention needed to be expanded and that the new approaches needed to be explored for effectuating a crime resistant environment that is also pleasant in other respects. Policing and urban planning could no longer remain isolated functions within a municipality. It is interesting to note that while Planning Departments have traditionally maintained liaison with Departments of Fire, Building and Safety, and Community Development, law enforcement has remained somewhat removed from the planning process. While this interaction is now only in its infancy, a number of research projects have been completed and the findings in many instances offer insight for both police and planning personnel.

Much of the research conducted in this field is based upon the premise that for a crime to occur, three fundamental ingredients are necessary: motive, ability, and opportunity. Programs devised to treat various social ills are primarily focused upon the motives of crime. The ability to commit a crime is, to a large extent, a function of having the opportunity. Thus, research was oriented toward

<sup>3</sup> National Advisory Commission on Criminal Justice Standards and Goals, Community Crime Prevention, (Washington, D.C., January, 1973). P.195.



the reduction of crime via the removal of opportunity, without sacrificing community cohesion or environmental quality.

Perhaps the most noteworthy single author on the subject of crime prevention via physical design is Oscar Newman, a New York City planner and architect, who has published a book entitled Defensible Space. Additionally, an excellent summary of information regarding the subject was compiled by the National Advisory Commission on Criminal Justice Standards and Goals. As a result of their efforts, this body set forth recommendations for various aspects of crime prevention. Locally, the Southern California Association of Governments (SCAG) authored a “Study of Crime Prevention Through Physical Planning” in 1971. These sources can be examined by those who wish to have more detailed information.

While independent, academic research was not possible within the scope of this Safety Element, the matter of public safety would not be complete without directing attention to the most significant findings of other research efforts. The facts, concepts, and recommendations, as discussed below, will be incorporated in the land use allocation process, the formulation of housing policy, and other general plan activities.

In regard to criminal behavior as it relates to land uses, the following factors are of significance:

- Criminal offenders tend to choose the “place” over the “victim.” The location is of greatest concern to the offender.
- Outside surveillance indicators tend to deter criminals more than inside surveillance devices.
- An offender will tend to select a neighborhood and specific site where opportunities for committing a successful offense are best.

In examining the location of criminal activity, the following information is applicable to land use and urban design considerations:

- Less violent crime or even anti-social behavior occurs in parks than on the streets. Access to recreation areas appears to be of greater concern than the design of the park itself.
- “The implementation of an adequate lighting system has been shown to have some correlation with the reduction and deterrence of crime.”<sup>4</sup>
- Within most high-crime areas, most criminal activity actually occurred at certain, limited spots where opportunity was best. In other words, a high-crime area may be only deficient at a single location due to circumstances of the physical setting.

An examination of the available information clearly indicates that opportunity is directly correlated with actual criminal activity and that through the planning process, opportunity can be substantially lessened. Physical design can be accomplished in such a manner that it contributes to the creation of public spaces that serve to deter, rather than encourage crime. Specific areas of consideration should include but not be limited to the following:

- Public access to parks and other urban uses should be designed in such a manner that surveillance is enhanced. On-street parking, foyers, and similar enclaves should be minimized.
- In multi-family structures, design provision should be made to allow mutual surveillance. Common areas and entranceways should be well lighted and in open view.
- Improved street lighting and pedestrian path illumination should be provided in public areas.
- Abandoned and vacant buildings should be demolished to reduce availability to potential violators.
- Parking garages should be located in close proximity to activity centers.

---

<sup>4</sup> Ibid. p. 198

- Public areas should be improved so as to attract increased numbers of people and promote high activity levels, thereby increasing the number of observers, which promotes increased safety.
- Activity nodes should be centralized to avoid isolated crime opportunities.
- Neighborhood identity should be enhanced to encourage cohesion, so that potential violators might be more easily identified.
- Landscaping that would hinder visibility or increase user fear should be avoided.

The above list is by no means exhaustive. As specific planning and/or development considerations arise, other crime prevention measures may be appropriate. To assure comprehensive project review, Police Department personnel should become even more involved in the planning and development process. Proposed developments, street alterations, public facilities, and other similar projects should not be implemented without input from police personnel.

In terms of codes and ordinances, many communities are attempting to reduce crime through the adoption of new laws, which include security measures. "California is preparing statewide security standards for most buildings."<sup>5</sup> These Codes would serve as guidelines to assure the consideration of security factors in the design of buildings. When these guidelines become available at the local level, they should be reviewed as to their applicability and incorporated into the existing building code if deemed adequate. If the peculiarities of Long Beach are such that the State guidelines cannot be suitably applied, the City may exercise the option of developing its own security code. The inclusion of such security considerations is particularly important for developments in areas, which are experiencing an increasing rate of serious crimes.

---

<sup>5</sup> State of California, Office of the Attorney General, Attorney General's Building Security Commission, Preliminary Report to the California Legislature: Building and Security Standards (Sacramento, California, 1973)



# UTILITIES



## VII. UTILITIES

Four major utility operations are established within the City of Long Beach: Water, Gas Telephone, and Electricity. Both the Water and Gas operations are provided to the citizens by the City itself. Telephone service is provided by General and Pacific Telephone Companies, while electric power is generated and distributed by Southern California Edison Company.

Utilities in general provide life-sustaining services and are essential for urban living. As such, utilities are an asset, which must be continually supplied. In times of emergency, it is imperative that utilities be maintained and/or restored should services be interrupted. At the same time the utility services themselves may pose certain hazards to public safety should damage occur along the established support system. Because of the magnitude of responsibility involved, all of the existing utility systems have rather elaborate safeguards built into the network. By and large, safety measure are dictated to utility services by City ordinances, special commissions, State offices, or Federal requirements. Except in special instances where additional safety precautions may be warranted, the City is well protected from potential threats. In fact, the major threat is that the interruption of one service may hinder another utility service from functioning at its normal level. All of the utility services, however, have established networks throughout the City in such a manner that an interruption at one location may be by-passed and services provided via alternate channels.

### Utility-related Hazards

The City Water Department has two elevated distribution reservoirs with a combined storage capacity of 117,000,000 gallons of water. The Alamitos Reservoir consists of 23 steel storage tanks, while the Dominguez Reservoir consists of 12. Together these storage reservoirs could provide for approximately two average day's use in the even of an emergency. While these storage reservoirs are essential as a safeguard of the water supply, the rupturing of these tanks could be catastrophic. The Alamitos Reservoir, near the Traffic Circle, would be of greater concern due to the number of tanks involved and the

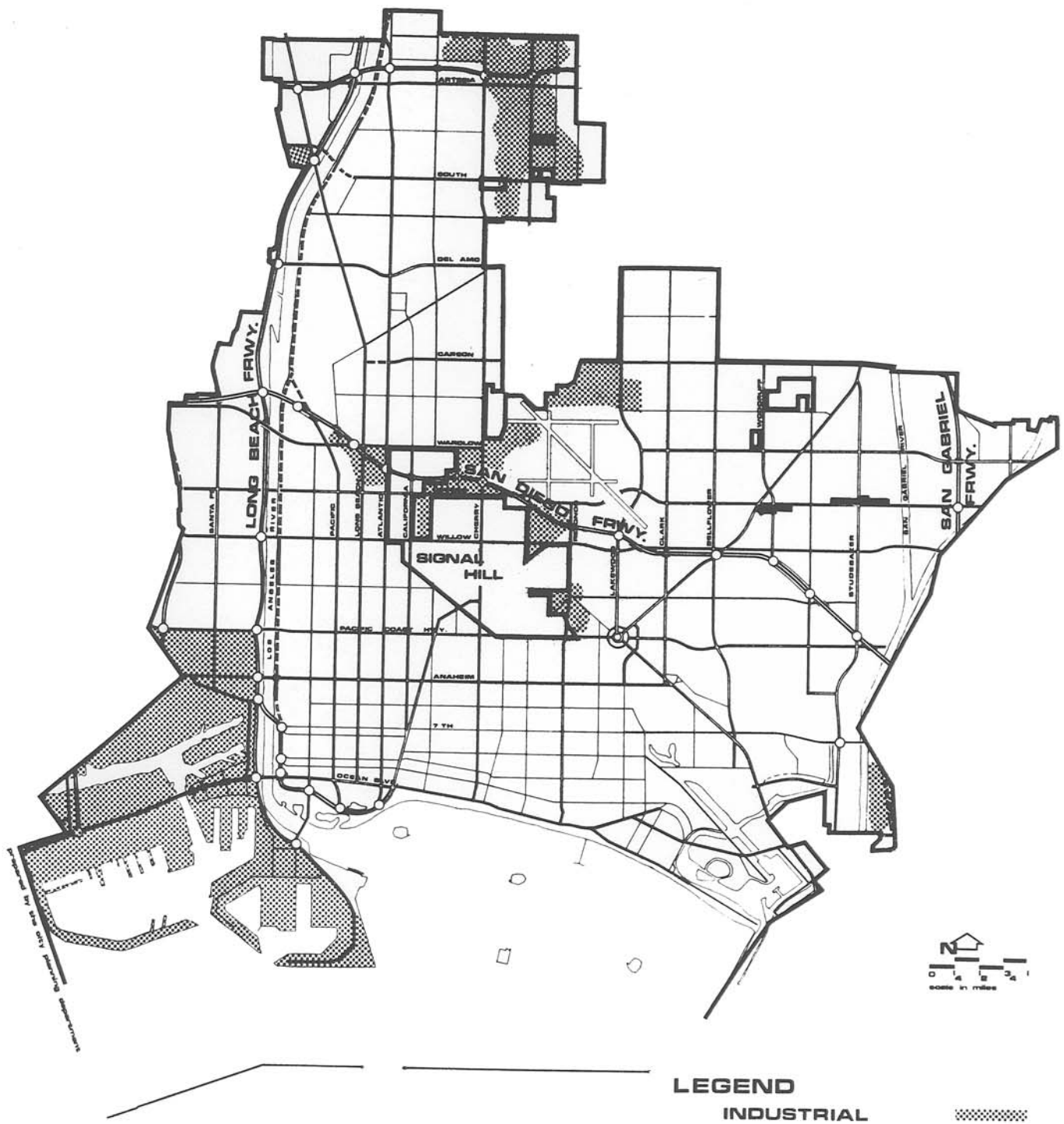
proximity to the Newport-Inglewood Fault Zone. While the tanks are earthquake-resistant and survived the 1933 quake undamaged, a substantial break along the fault trace could rupture several tanks, causing significant flooding in the downhill areas. The potential threat is substantially lessened by the fact that a fault rupture is not considered to be a probable event (see Seismic Safety Element.)

Southern California Edison Company maintains an electrical power generating and distributing network throughout the City. As a part of this system, overhead transformers and distribution lines have been installed in past years. Today, these utility facilities are underground except in special instances where surface or aboveground lines are required for technical reasons. Many of the older overhead utilities remain, however, aside from the aesthetics involved, these overhead transformers and lines are subject to falling in the event of an earthquake. While the transformers switch off upon being grounded, a potential safety threat exists as a result of their suspension. While the safety hazard is not great, these suspended utilities should be installed at or below surface as is feasible.



# **INDUSTRIAL/ TRANSPORTATION**





# **INDUSTRIAL LAND USE**

PLATE 12

## VIII. INDUSTRIAL/TRANSPORTATION

Like utilities, industrial and transportation related activities are essential to the livelihood and economic well being of the community. While these activities are an asset, they also pose certain potential hazards. Industries and transportation are controlled by numerous Commissions, State regulations, and Federal guidelines. While a certain risk is created as a result of these activities, hazards are usually minimal. No Safety Element, however, would be complete without a review of the most salient industrial and transportation related hazards.

### Industrial Land Uses

Long Beach has 1, 684 acres of industrial land use. For the most part the industrial areas are concentrated in five locations of the City: the harbor area, the Westside industrial area (just north of the harbor), in and surrounding the airport, in north Long Beach, and on the eastside at the conjunction of Westminster and Studebaker Road. (See Plate 12).

From a public safety standpoint, the greatest threat is that of encroachment of industrial activities into other areas of the City. This mixing of incompatible land uses presents itself in the west Long Beach area. An Economic Development Corporation has been formed in Long Beach to effectuate industrial revitalization in this Westside area. The area as it now exists is primarily composed of small-scale operations. The situation of incompatible land uses also exists in the north Long Beach. Numerous remedial measures have been considered for the area over the years. Most mitigating measures, however, would be quite expensive and of limited benefit. In view of the deleterious nature of such incompatibly placed land uses, it is incumbent upon the City to avoid such mixtures in the future development of the City.

### Transport of Hazardous Materials

The California Department of Transportation (CALTRANS) sets forth regulations and restrictions upon the transporting of dangerous fluids, chemicals, or explosives. In the City of Long Beach, designated truck routes are established. These routes are delineated on Plate 13, along with freeways and

railroads. Aside from the routine safety precautions, the City Fire and Police Departments are alerted when shipments of particularly dangerous materials are due to pass through the City. For the safety of the workmen, Longshoremen and Teamster Unions also require shippers and transporters of dangerous materials to take precautionary measures.

In terms of public safety, the areas immediately adjacent to designated truck routes should be allocated for low occupancy land uses, thereby exposing a fewer number of people to potential risk. The difficulty, however, is that truck routes are generally major arterials, offering ease of access for commercial and multi-family residential uses. Through physical planning and spatial design, however, an effort should be made to buffer all uses from passing dangerous materials by way of set-backs or natural barriers.

"In 1967, CALTRANS, the County of Los Angeles, and the California Highway Patrol negotiated with the Pacific and General Telephone Companies for the installation of call-boxes on approximately 310 miles of Los Angeles County freeways."<sup>1</sup> The Long Beach Freeway south of Anaheim Street, however, is not State maintained and thus was not equipped with emergency phones. As this portion of the freeway is designated as Harbor District responsibility, the area is patrolled rather regularly by Harbor Department personnel. Because of the close observation of the area, accidents are likely to be detected rather quickly. Nonetheless, a number of recent freeway accidents have occurred, involving such things as gasoline carriers and the potential hazard may justify the installation of phones along this stretch of the freeway from Anaheim Street to the Harbor area. A cost benefit analysis of freeway phones installations in this area should be further examined.

#### Aircraft Safety

Annual operations at Long Beach Airport are at a level of approximately 560,000. The majority of operations at Long Beach are general aviation aircraft,

---

<sup>1</sup> Emerson, A.D., ed., Proceedings: Greater Los Angeles Area Transportation Symposium (L.A. Section, Volume 14, Western Periodicals Company, North Hollywood, California, 1974). p. 107

with business jets and large jet operations constituting the remainder.<sup>2</sup> Potential aircraft crashes pose a certain public safety hazard to residents of the area, but aircraft safety regulations are strictly enforced by the Federal Aviation Administration and accidents are relatively few. Nonetheless, some tank farms and above ground storage of other dangerous fuels are incompatibly located in close proximity to airport operations. Future land use planning must recognize such hazards and provide for adequate spacing of these incompatible uses. It is particularly important to avoid placing fuel storage facilities in line with the established flight pattern.

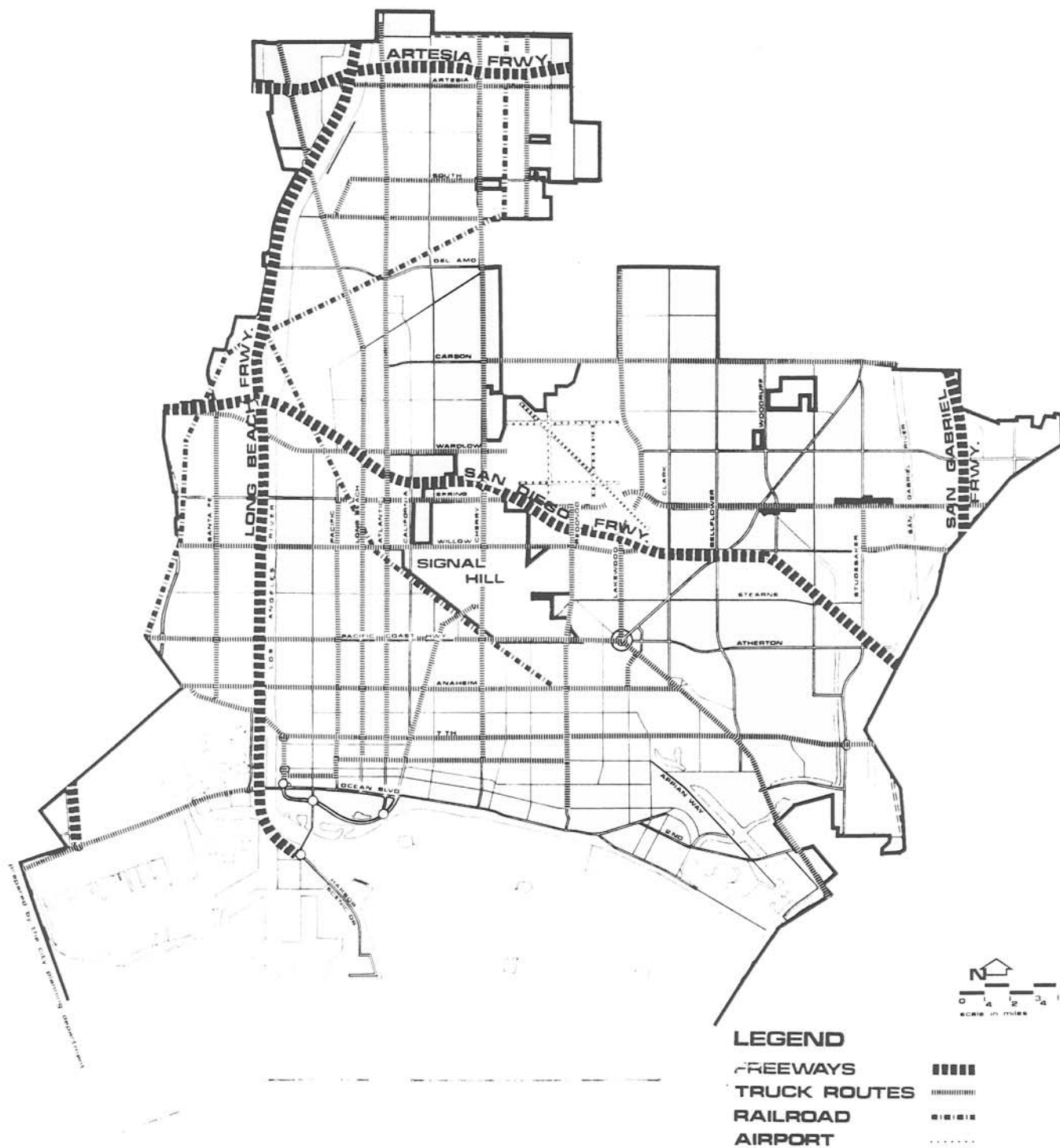
---

<sup>2</sup> City of Long Beach, Planning Department, Noise Element of the Long Beach General Plan (Draft Copy).

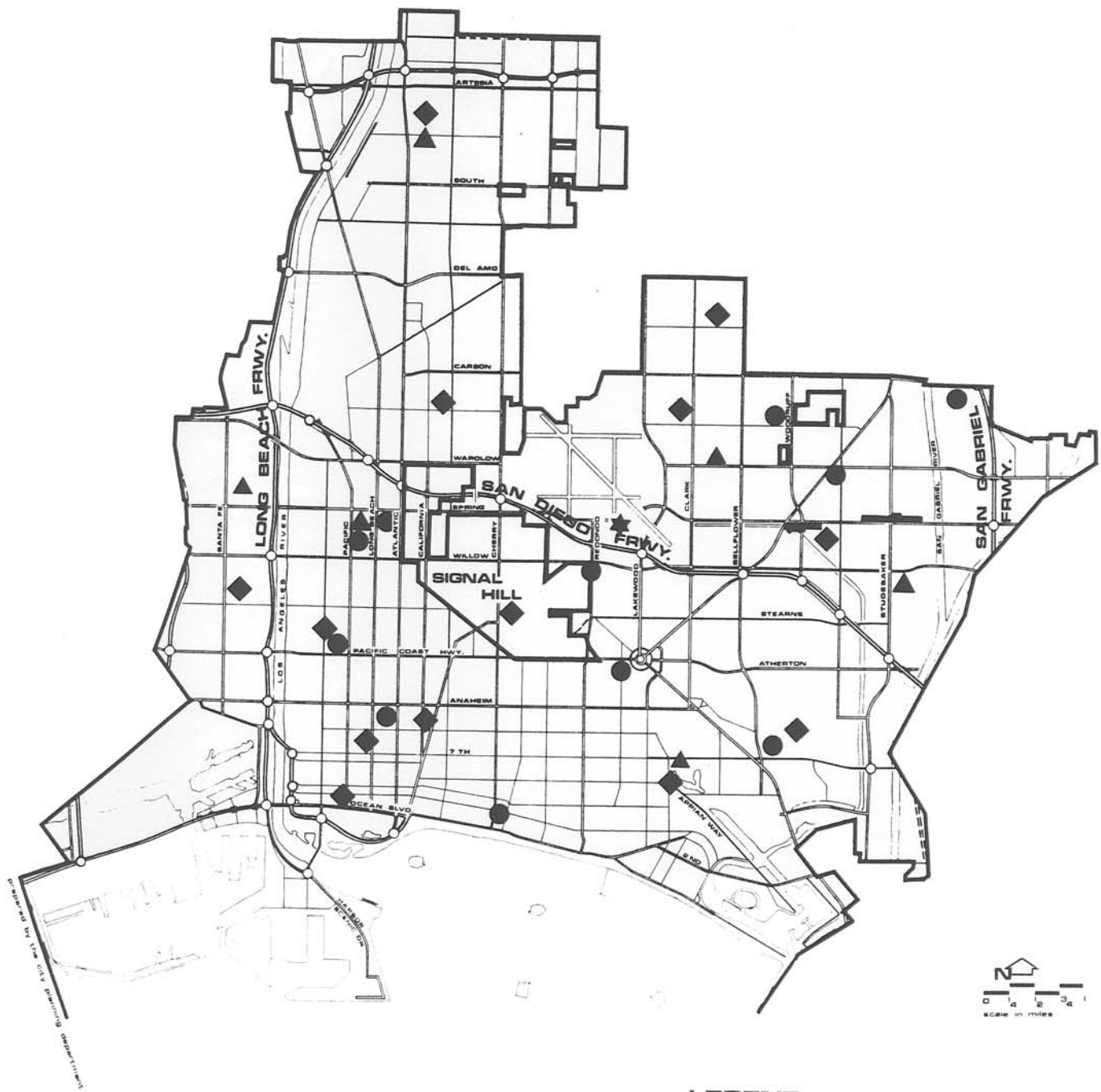
# **DISASTER OPERATIONS**







# TRANSPORTATION ROUTES



- LEGEND**
- FIRST AID CENTERS
  - EMERGENCY SHELTERS
  - HOSPITALS
  - EMERGENCY OPERATING CENTER



# COMMUNITY DISASTER RESOURCES

PLATE 14

## **IX. DISASTER OPERATIONS**

Disasters may be caused by man or nature. The ability to survive disaster adversities is dependent to a great extent upon the degree of preparedness that exists prior to the event. Emergency preparedness includes the process of evaluating and attempting to minimize potential disaster occurrences. Should a disaster take place, emergency preparedness would minimize the ill effects and effectuate a rapid recovery. The primary purpose of disaster operation and civil defense is to protect lives and property, preserve the continuity of civil order, and restore a viable and functional economy. While it is hoped that such disaster operations need never be activated, the City would be remiss in its obligation to the citizens if such preparedness were not provided.

### **Emergency Operating Center (EOC)**

The Long Beach Department of Emergency Preparedness is located at 4040 East Spring Street near the Airport. (See Plate 14.) Its underground facility was originally a Nike Ajax Missile Site, but now serves as the central operating base for all civil defense activities. In the event of a disaster, this Emergency Operating Center (EOC) would become the command post for coordinating manpower, equipment, resources and facilities. Through the use of the communications network, the disaster coordinator can assemble information from the field, assess existing situations throughout the City, provide resources, organize disaster services, and keep the public informed.

The underground Emergency Operation Center consists of three separate activity areas, divided by corridor walkways. The east chamber is the administrative headquarters and provides an assembly and briefing area. The walls of this area are surrounded by displays and graphic illustrations, which can be used to record events as they occur during a time of emergency. The east chamber also houses the communications and operations groups. The center chamber houses the utilities and supporting staff. This supporting staff may analyze or interpret information so it may be forwarded to the administrative advisors and chiefs in the assembly area. The west chamber of the Center

consists of living facilities to be used by the “Operations Group” during a disaster event. This area has an infirmary, kitchen, dining room, and dormitories. While the facility is designed to handle disaster relief activities, the City makes day-to-day use of the available space for conducting training courses, holding conferences, and so forth.

### Manpower

All City employees are registered disaster service workers. When the emergency organization is activated, the City Manager or his designated alternate directs disaster response activities. Department heads and other designated City officials will serve as deputy directors and service chiefs in the emergency operation. These key personnel will locate themselves in the assembly area in the east chamber of the EOC facility. Additional City employees will serve as support personnel for providing specific information, analysis, and services. These support services include the areas of communications and warning, situation analysis, housing and shelter, health and medical, welfare, fire and rescue, law enforcement and traffic control, public works, economic stabilization, utilities, transportation, building and safety, and others.

### Communications

In the event of a disaster, communications are essential for the coordination of various service operators and field workers. Furthermore, it is imperative that the public be kept informed. Through the Emergency Operating Center, the City has access to a variety of radio, telephone, and teletype resources, including the following:

- EOC-City Government radio networks, including the mobile communications center.
- Existing radio networks of the Police, Fire, Health, Public Service, and Marine Departments.
- RACES (the amateur radio operators)

- REACT (the citizen band radio operators)
- GTE mobile radio telephone service
- Radio networks used by local commercial companies
- Municipal telephone system
- GTE facilities
- Police Department Teletype network, which is an intra- and inter-State system.

A great deal of the communications flow will be received and transmitted through the communications room of the EOC. Numerous telephones are provided in the assembly area for the continuous use of service chiefs and advisors.

In addition to the elaborate communications network throughout the City and surrounding area, national communications is assured by two direct connections with NAWAS, the national warning system. Information regarding disasters anywhere in the U.S. are reported to the NORAD headquarters near Denver, Colorado. Long Beach can become informed of disaster situations in other locales or potential dangers that may be anticipated via two direct taps into this national warning system. One communication terminal is located in the underground Emergency Operating Center and the other is tied into the fire dispatch system at Fire Department headquarters.

### Evacuation

To protect the populace from potential or imminent danger, it may be necessary to evacuate portions of the City. Evacuation procedures would need to be coordinated through the Police Department so as to avoid chaos and panic. Through radio announcements and helicopter loudspeakers, residents of an evacuation area could be alerted. It is not practical to establish firm routes of evacuation, as the areas to be affected and the possible routes to be used would vary depending upon the disaster and the street conditions at the time.

While it is impossible to determine exact areas that may be subject to evacuation or to establish definite routes of evacuation, degree of preparation is possible by an examination of causative factors and constraints in implementation. Plausible events, which could necessitate evacuation, include earthquakes, tsunamis, major fires, leakage of dangerous fuels, chemical explosions, and flooding. In many instances it is difficult to anticipate where hazards may present themselves. In terms of the geologic hazards, however, available information serves as indicators of potentially hazardous areas in the event of an earthquake or flooding. The areas with the greatest potential for major damage are shown on Plate 11. Essentially, these areas include the western and eastern extremities of the City and the Shoreline area, which connects them. In view of this information, alternate strategies for evacuating these areas should be developed.

Regardless of the areas affected by possible evacuation, good reliable information is of the greatest importance. The extent of the problem of potential danger, what areas could be affected, what direction provides the safest route of escape, and other similar types of information are essential to an evacuation operation. As time would be of the essence, pre-disaster strategies are imperative. As a matter of preparation, a determination should be made of critical points throughout the City, which would be necessary in order to evacuate various areas. Critical points would include major arterials and traffic interchanges. Teams of police personnel could be assigned to specific critical points. In the event of a disaster, these personnel would be responsible for checking and reporting the condition of the major evacuation points to the EOC. With this information readily available, disaster coordinators could more quickly determine the most appropriate evacuation strategy.

For the most part, evacuation of any portion of the City would be accomplished by private automobile. Senior citizens, low-income residents, hospital patients, and others, however, may not have immediate access to private transportation. To provide mobility for these groups the disaster director has the authority to direct all public buses to the endangered area. The matter of

coordinating bus pick-up points and notifying the people to be evacuated is another matter, which is largely dependent upon the immediate availability or reliable information.

In the event of a major earthquake, extensive land areas throughout the City may be affected. It is conceivable that numerous traffic corridors could be severed. Freeways, in particular, have proven to be unreliable sources of passage. Primarily because of the numerous bridge structures, freeways often survive poorly during major quakes. The partial collapse of any one-bridge structure or embankment fill cripples that artery. Also some, but probably not all, roads which pass below or over freeways will not be passable after a major event. Should damages be that extensive, the City could be isolated in terms of ingress or egress. As it would involve a great deal of time to repair these roadways, the problem could arise of sustaining the population with food staples, medical supplies, and other essentials. Fortunately, Long Beach is fronted by water and has airport facilities. Should the streets and freeway systems be so impaired as to cut-off supplies from other areas, access to the City is possible by water or air.

### Community Resources

Within the City there are numerous physical resources, which could be utilized to provide needed shelter, medical treatment, or other necessary services. In terms of protection, there are 220 licensed fallout shelters in the City. For hospital care, Long Beach is served by 10 separate institutions: Memorial, St. Mary's, Community, Pacific, Veterans, Los Altos, Woodruff Community, U.S. Naval, El Cerrito, and Long Beach General. Furthermore, the City has established 13 First Aid Centers. Most of these centers are school or public facilities, which can be quickly converted for this use. Emergency Shelters can also be provided throughout the City at various recreation facilities. (Plate 14 shows the locations of Hospitals, First Aid Centers, and Emergency Shelters.) The Queen Mary is another community resource, which could shelter and protect an estimated 8,000 people if necessary. In addition to the above, Long Beach

has numerous auxiliary and convalescent hospitals which could be used for treatment and care of disaster victims.

### Disaster Assistance

Emergency Preparedness in Long Beach is an integral part of an overall system, which connects the City with higher levels of Government. The City may call upon the County, State of California, or the Federal Government to obtain assistance in handling any disaster. Los Angeles County is sub-divided into seven civil defense areas, with Long Beach, Lakewood and Signal Hill being Area "F". Civil Defense operations from other jurisdictions will provide recovery aid should it be warranted under the States Mutual Aid Pact. Both the State and Federal governments have established programs allowing local communities to apply for financial and other types of assistance. Monies may be allocated to local communities when a major disaster occurs. Assistance formulas are set forth based upon the type and degree of disaster. Through the various State and Federal agencies and private organizations, individuals affected by the disaster may be eligible for grants, food stamps, commodity programs, unemployment compensation, temporary housing, rent and mortgage payment, legal aid, and so forth.

### Disaster Exercises

So as to assure a state of readiness, the City's Department of Emergency Preparedness conducts periodic disaster exercises. City personnel from every department are assigned to participate in the drills, performing functions comparable to those, which may be required in a time of actual emergency. Various conceivable disasters are then simulated so that alternative solutions may be tested. Most recently the City conducted a disaster simulation exercise in conjunction with the University of Southern California and the System Development Corporation. This was part of a research effort to develop guidelines for the response of government to natural disasters. The research was designed to improve conceptual planning for the operational management of



natural disasters. Continual involvement in these types of emergency operations is of great benefit to the City in terms of learning to effectively deal with possible disasters.

### Citizen Safety

While the Department of Emergency Preparedness will keep the citizens informed during a time of disaster, the process of evaluating the extent of the problem and mobilizing disaster operations involves time. During a disaster, this time can be precious and can affect the safety and well being of citizens. Simulated disaster operations, as discussed above, reduce the response time and assure the citizen of a greater degree of safety. Nonetheless, it is essential that citizens themselves become aware of how to prepare for and react to an emergency situation. Appendix "A" provides some valuable tips on what to do and what not to do in cases of fire, earthquake, and flood.

The Departments of Emergency Preparedness, Fire and Police now have public education programs. Greater emphasis upon public awareness, however, is always warranted. Through the media, the public education programs, citizen participation, and other lines of communication, a greater dissemination of Safety information should be implemented.

In an effort to assure immediate emergency services, in 1972 the State of California adopted legislation requiring Cities to establish a "911" emergency telephone system. Through the "911" system, all emergency services, including police, fire, ambulance and medical assistance, can be obtained by dialing a single number: 911. This emergency telephone system is now being planned by the City, with inputs from all safety oriented departments and General Telephone Company. A tentative City-wide Plan was completed in January 1975 and the system itself is expected to be operational by July of 1977. During a time of disaster, this system will provide citizens a direct line of communications with disaster coordinators.



# **RISK MANAGEMENT**



## **X. RISK MANAGEMENT**

Within the framework of local City government, there is a division of labor in terms of public safety. Basically all Departments and agencies involved can be categorized into one of the four following organizational groups:

1. Planning and preventative groups.
2. Action-oriented groups (i.e. handling the immediate crisis)
3. Resource groups (i.e. assisting in handling the immediate crisis)
4. Recover groups (i.e. administrative assistance with grants, aid, programs, etc.)

While there may be a certain degree of overlap involved, most City departments and agencies are primarily oriented toward one of the above listed activity groups. The principal emphasis of this document is one of planning and prevention. To accomplish the desired results, the scope was by necessity, rather broad. Specific safety aspects of a particular site, project, development, or activity were not examined in depth. It is imperative, however, that such scrutinizing of necessary safety precautions be employed.

The City of Long Beach now has a position of City Safety Officer. The City Safety Officer is involved in preventing injury to City employees, matters of workmen's compensation, traffic problems, limited public liability difficulties, and similar matters. Due to recent changes in Federal and State laws requiring cities to better insure themselves against all types of hazards, many communities are expanding the role of safety personnel. A relatively new field has emerged which encompasses all aspects of public safety. This new area to expertise is most often referred to as risk management. It originated out of a need to evaluate insurance needs and programs, but has been expanded to include the following types of functions:

- Identifying hazards with significant potential to create large financial losses;
- Prioritizing hazards as to potential loss, extent of risk, and remedial costs to reduce the hazard;
- Estimating economic effects of predictable losses;

- Establishing insurance needs in view of probable loss;
- Designing insurance coverage that meets the particular needs of the City;
- Continual risk re-evaluation based upon new or changing exposures to employees or the general public;
- Coordinating safety activities with safety personnel working in the private sector (i.e. work closely with harbor and airport safety experts to assure safe operations on the ground as well as reducing potential risk to nearby residents);
- Establishing mechanisms to accumulate funds to pay losses.

While many of these activities are now conducted by the City, coordination is often difficult. The practicality of establishing a formal Risk Management Program in the City should be examined. The primary responsibility of such a program would be to make systematic and continuous reviews of all safety and insurance matters.

#### Levels of Risk

The process of risk management involves a thorough examination of numerous factors. The probability of occurrence, cost of remedial actions, potential economic losses, human safety considerations, and a host of other variables come into play. Even with expert review, establishing a level of acceptable risk is often a very subjective process. How safe is safe enough, is always open to question. In most instances, decisions regarding subjective judgments should be made by groups of experts from various disciplinary fields rather than single individuals. Risk management could include committee activities so as to assure comprehensiveness and eliminate bias. With adequate information, this group approach offers reliability and good cross-sectional representation.

In formulating the approach and scope of this element, an initial step was taken toward group decision-making in evaluating various risks in terms of acceptability to the community. A list of potential risks was sent to 48 separate

City Departments and private organizations, including local hospitals, industries, and utility companies. The respondents were selected because of their expertise or close association with matters of public safety. While more broad-based citizen input is usually preferred, it was felt that this group would be in a better position to subjectively evaluate the level of risks presented in regards to this particular project. Unless one has at least a rudimentary knowledge of potential risk factors, it is difficult to estimate a degree of possible danger.

The respondents were asked to rate each of the listed risks as either “Acceptable” or “Unacceptable.” As no factual information was provided, the rating was largely an exercise in subjective judgments. Nonetheless, the over all response is of interest and serves as an indicator of community feelings. Table 8 shows the list of risks with the acceptability rating. In general, it was felt that exposure to risk within the community is acceptable. Upon closer examination, comparison, and groupings of the responses, however, some specific and significant attitudes can be extrapolated:

- Industrial hazards were generally considered acceptable risks. It was either felt that the amount of risk was not substantial or that the level of risk was justifiable in view of the economic benefits derived from the industrial activity.
- The possible rupture of a water, oil, or chemical tank was the only industrial risk, which received a substantial number of “Unacceptable” ratings. In terms of industrial land uses, this would imply a desire to discourage the large-scale storage of these liquids within the City, particularly in areas of greatest potential seismic activity.
- Minor seismic events were considered “Acceptable,” while major events were “Unacceptable” by over 50 per cent of the respondents. The variation in response suggests that planning and preparation be geared to coping with the maximum probable catastrophe. In other words, the City should make provisions for handling the worst possible eventuality.

- The response for the risks of tsunamis and seiches were almost equally divided between “Acceptable” and “Unacceptable.” By comparison to the ratings in general, tsunamis and seiches were considered substantially less acceptable. As a warning time is usually possible, adequate evacuation procedures are of particular concern in areas susceptible to these seismic hazards.
- A significant proportion (near 50 percent) of the respondents felt that building collapse was an “Unacceptable” risk. This suggests a need to accelerate programs for the removal of unsafe structures and a further implementation of subdivision 80 of the existing building code. Unlike a seismic event, which there is little or no control over, the soundness of structures within the City is a factor, which can be influenced by City action.
- In terms of aircraft safety, the levels of Acceptability were nearly equivalent for large and small aircraft. This implies that the “crash” is more of an important consideration than the size of the crash. Of greatest concern was the location of the crash. Possible aircraft crashes on the Airport grounds or in water were more “Acceptable” than possible crashes on land off the Airport properties.
- Panic during a catastrophic event received the largest number of “Unacceptable” ratings. It can be surmised that while many potential disasters cannot be removed or alleviated, preparedness in dealing with the problem and maintaining order is of paramount importance.



TABLE 8  
RESULTS OF QUESTIONNAIRE REGRADING RISK ACCEPTABILITY

Nature of Potential Risk	Acceptable	Unacceptable
Oil Storage Tanks	15	0
Oil and Gas Transmission Lines	13	1
Petroleum Handling at Port	14	0
Water, Oil, or Chemical Tank Rupture	10	6
Tanker Trucks on Highways	15	1
Transport of Explosives on Streets	12	2
Ammunition Aboard Naval Vessels	14	0
Natural Gas	14	1
Industrial	14	0
Power Stations	12	1
Major Seismic Event	7	8
Minor Seismic Events	14	1
Tsunamis	8	7
Seiches	8	7
Earth slides	13	2
Liquefaction	6	3
Building Collapse	9	7
High Rise Buildings	12	1
Severing of Major Road Links	12	2
Bridge Collapse	11	4
Severing of Water Supply System	10	4
Severing of Sewage Trunks or Plants	10	4
Severing of Power System	9	5
Severing of Natural Gas	9	5
Severing of Food Supply	8	6
Large Aircraft Crash On Airport	12	1
Large Aircraft Crash Off Airport	9	4
Large Aircraft Crash In Water	13	2
Small Aircraft Crash on Airport	12	1
Small Aircraft Crash Off Airport	12	1

TABLE 8 - continued  
RESULTS OF QUESTIONNAIRE REGRADING RISK ACCEPTABILITY

Nature of Potential Risk	Acceptable	Unacceptable
Small Aircraft Crash In Water	10	3
Panic During Catastrophic Events	7	10

Note: All respondents did not rate every potential risk. The total responses, therefore, under each category may differ.

# **RECOMMENDATIONS**



## **XI. RECOMMENDATIONS**

This section indicates areas of improvement and suggests recommendations necessary for attaining the established public safety goals. Because of the rather large array of public safety considerations covered in the report, recommendations include a variety of City activities. In terms of an implementation timetable, the recommendations are short, intermediate, and long range. For discussion purposes, however, the proposed actions are divided into two major categories: Immediate action recommendations, and Advance Planning recommendations. The former relate to matters of immediate interest, while the latter type are more policy oriented and serve primarily as guidelines for future land use allocations and continued urban development. While the immediate action recommendations may have a greater impact upon current City activities, the Advance Planning Recommendations often relate to developmental policy and may have a more significant effect upon the City's future.

### Immediate Action Recommendations

1. In an effort to further improve the insurance services rating for Long Beach, implementation of recommendations of the Insurance Services Office for improving fire protection in the City should be considered seriously. Removal of 100 deficiency points from the Insurance Services Office Survey would allow Long Beach to be rated in Class I. There has never been a city in the history of fire ratings to achieve this classification. The effect would be lesser fire insurance cost for non-residential land users.
2. The fire station relocation program should be implemented as specified in the Capitol Improvement Program. Based upon computer analysis, the station relocater program recommends the phasing out of 8 existing stations and the construction of 8 new facilities. In actual site selection for the new fire stations, inputs should be obtained from other City Departments, including the City Planning Department.

3. Evidence has substantiated the need for built-in fire protection measures in high-rise buildings. As much of Long Beach's future development is expected to consist of recycled land use, that is, land being redeveloped at a greater intensity of use than it has been previously, it is reasonable to anticipate some new high-rise construction. In an effort to provide better fire safety to the citizens, it is recommended that the 1973 Uniform Fire and Building Codes with amendments be adopted by the City. This proposed ordinance specifies built-in fire protection equipment for structures of more than 55 feet in height.
4. Many of the older buildings in the City do not meet good fire protection standards. Of particular concern is the problem of open stairways. Chapter 13 of the appendix of the proposed 1973 Uniform Building Code recommends provisions for stairway enclosures. To provide a reasonable degree of life safety to occupants of such buildings, it is essential that these provisions be adopted.
5. The City of Long Beach has an abundance of old un-reinforced structures, which serve as potential risks in the event of an earthquake. Subdivision 80 of the Long Beach Municipal Code relates to the Rehabilitation of these Pre-1933 buildings. Due to the magnitude of the problem, particularly in the CBD, enforcement of the ordinance has been accomplished on a gradual and incremental basis. In view of the safety hazards presented by these un-reinforced buildings, however, consideration should be given to accelerating the implementation of Subdivision 80.
6. Consideration should be given to retaining the services of a structural engineer to recommend methods of revising existing building regulations to provide for adequate damage-control features in regards to earthquake resistant requirements.

7. As a part of the Southern California Edison Company's distribution network, a number of overhead transformers and lines are located throughout the City. These suspended utilities should be installed below or at surface as is feasible so as to avoid the risks of having the equipment fall in the event of an earthquake.
8. The Long Beach Freeway south of Anaheim Street is not State maintained and thus is not equipped with emergency phones. The installation of phones along this stretch of the Freeway from Anaheim Street to the Harbor area may be warranted. A cost benefit analysis of the installation of emergency phones in this area should be conducted.
9. While it is impossible to determine exact areas that may be subject to evacuation a determination should be made of critical points throughout the City which would be necessary in order to evacuate various areas. Critical points would include major arterials and traffic interchanges.
10. When the City is involved in disaster operations at the EOC it is imperative that the decisions (which must often be quickly arrived at and usually under considerable stress) be based on the latest and most comprehensive information available. The system currently used in the EOC for placing information in the hands of the decision makers may not be completely adequate during an actual disaster. Consideration should be given to augmenting the existing system with modern electronic display equipment.
11. In an effort to assure immediate emergency services, in 1972 the State of California adopted legislation requiring cities to establish a "911" emergency telephone system. It is recommended that the City continue to give priority to this project so it may become operational by the target date of July 1977.

12. Consideration should be given to establishing a Risk Management program, which would allow the City to make a systematic and continuous review of all safety and insurance matters.

### **ADVANCE PLANNING RECOMMENDATIONS**

13. As the occurrence of fires appears to be associated with the conditions and age of the structures, an effort should be made to recycle areas, supplanting deteriorated structures with new developments.
14. Density is a public safety factor in that a higher occupancy would result in an exposure of more people to a hazard. Therefore, from a public safety point of view, lower density is preferred.
15. As public safety problems such as fires and crime appear to be correlated with socio-economic factors, efforts should be made to improve opportunities for better education, employment, and self-improvements.
16. Accessibility is essential for fire-fighting and rescue vehicles, thus it is imperative that adequate street width be allowed for such equipment. At least two directions of ingress and egress should be available to all structures or grouping of structures. This allows people to leave an endangered area, while fire-fighting equipment may be entering the area simultaneously.
17. In terms of industrial growth, the City should strive to attract the least hazardous types of industries.
18. Setback requirements, open space allowances, and adequate off-street parking facilities are three pertinent factors, which directly affect the intensity of land use. The problems associated with intensive land use and property coverage are evident in areas zoned R-4. While zoning involves the consideration of numerous other factors, fire safety should be a major factor influencing any changes in the existing zoning regulations.



19. New development should be responsive to seismic considerations.  
(See Seismic Safety Element).
20. Pre-1933 structures should continue to be the first priority for recycling.
21. Crime is associated with an unstable population element and efforts should be made in the planning process to encourage developments that would tend to stabilize an area.
22. Special considerations should be given to the needs of senior citizens, particularly in the downtown area. Specific areas should be designated in the land use allocation model for development of senior citizen centers, which could include residential and localized commercial uses. Public transportation should be readily available to allow access to other areas of the City.
23. In terms of crime prevention, access to recreation areas appears to be of greater concern than the design of a park or recreation site. Therefore, public access to parks and other urban uses should be designed in such a manner that surveillance is enhanced. On-street parking, foyers, and similar enclaves should be minimized.
24. In most high crimes areas, much criminal activity actually occurred at certain, limited spots where opportunity was best. These locations should be identified and corrected in terms of the land usage.
25. In Multi-family structures design provisions should be made to allow for mutual surveillance. Common areas and entranceways should be well lighted and in open view.
26. Improved street lighting and pedestrian path illumination should be provided in public areas.
27. Abandoned and condemned buildings should be demolished to reduce availability to potential law violators.
28. Parking garages should be located in close proximity to activity centers.

29. Public areas should be improved so as to attract increased numbers of people and promote high activity levels, thereby increasing the number of observers, which promotes increased safety.
30. Activity nodes should be centralized so as to avoid isolated crime opportunities.
31. Neighborhood identity should be enhanced to encourage cohesion, so that potential violators might be more easily identified.
32. Landscaping that would hinder visibility or increase user fear should be avoided.
33. To assure comprehensive project review, Police Department personnel should become even more involved in the planning and development process. Proposed developments, street alterations, public facilities, and other similar projects should not be implemented without input from police personnel.
34. Consideration should be given to incorporating security factors into the existing building code. The inclusion of such security considerations is particularly important for developments in areas, which are experiencing an increasing rate of serious crimes.
35. Industrial land uses should be isolated or well buffered from any adjoining residential uses.
36. Through physical planning and spatial design (e.g. setbacks, or natural barriers), an effort should be made to buffer all urban uses from routes designated for transporting dangerous fluids, chemicals, or explosives.
37. Above ground fuel storage facilities should not be located in close proximity to the flight pattern at the Long Beach Airport.
38. Through the media, public education programs, citizen participation, and other lines of communication, a greater dissemination of safety information should be implemented.

39. It is recommended that the City encourage the use of new technology in the area of Public Safety.



# **APPENDIX A**



## APPENDIX A

### NATURAL DISASTERS IN LONG BEACH

FIRE      EARTHQUAKE      FLOOD      FIRES

Destructive fires are an ever-present danger. There are specific things that can be done, however, to prevent fires and to control fire.

### WHAT TO DO

#### IN YOUR HOME

**IF** - you suspect that any part of your house may be on fire

**DO NOT** open an inside door without first placing palm of hand against it

**IF** - there is heat **OR**

**IF** you see smoke seeping around the edge

**DO NOT** open the door! You could be overcome by smoke, heat or flames.

**IF** – the fire is out of control

Get away from the danger...**ESCAPE**...then call the Fire Department.

- Keep the telephone number of your fire department near your phone.
- Be sure to give the fire department the correct address of the fire.
- Have heating appliances checked at least once a year.
- Check correct size and use of extension cords.
- Keep matches and lighters out of children's reach.
- Don't let children play in canyons.

## APPENDIX A – CONTINUED

- Use and store flammable liquids correctly.
- Don't smoke in bed.

**IF** – your clothing catches on fire....***DO NOT RUN***....

- Wrap yourself in a blanket or rug...and roll.

**IF** – you must rescue someone in a room that is on fire

- Wrap a wet handkerchief, towel or similar article, around your face, open the door cautiously, and keep as close to the floor as possible, crawl to the victim. Then remove him to safety, remaining close to the floor.

**IF** – you detect the fire in time and can control it, use the following methods to extinguish the blaze:

1. Put out Electrical, Grease, Oil or Gasoline fires by smothering with handfuls of SALT, BAKING SODA, SAND or DIRT.
  - a. Never use flour.....it's Explosive!
  - b. Never use water on Grease, Oil or Gasoline fires. It will only spread them!
  - c. Don't throw water on electrical fires until electrical fires until electricity has been first shut off at master switch or fuse box.
2. Extinguish burning paper, rags or other non-oily trash fires by throwing water at the base of the flames.

## OUTDOORS

**IF** – your neighbor's property is on fire, help prevent its spreading by wetting the roof of your house and garage with the garden hose.



## **APPENDIX A – CONTINUED**

**IF** – your house, garage or other building are on fire, call your Fire Department, then try to keep it under control by using your garden hose. (It is wise to have sufficient hose to reach any portion of your house or other buildings on your property.)

### **BRUSH FIRES**

1. Keep the area around your property clear of trash and rubbish.
2. Keep a supply of gunnysacks handy. When wet, they will aid in fighting fires.
3. Surround your property with Ice Plants. It is a big help in controlling the spread of fires.
4. If there is a fire in your neighborhood, keep the exterior of your buildings as wet as possible until the Fire Department arrives.
5. Do not hesitate to leave for safer areas when advised to do so by Fire Department officials.

### **FIRE FIGHTING TIPS**

1. Give your house and yard a good cleaning.
2. Keep plenty of water on hand.
3. Keep your fire fighting equipment in good order and ready for use. Know how to use it.
4. Make your family a fire fighting team.
5. Don't lose your head. Fires can be fought.
6. Never stop fighting a fire except to save your life.

## APPENDIX A – CONTINUED

7. Don't search a burning building alone.

### EARTHQUAKES

A major earthquake must be considered as an ever-present possibility here, even though none has occurred in recent years. Two-thirds of the earthquake activity in the United States is centered in the Pacific coastal ranges and mostly in California.

#### WHAT TO DO

##### **IF INDOORS, STAY INDOORS**

Take cover under a desk, table, or bench, or in doorways, halls, or against inside walls. Stay away from glass windows or skylights. **DO NOT** run outdoors!! You may be hit by falling debris or live electrical wires.

##### **IF OUTDOORS, GET AWAY FROM BUILDINGS**

Go to clear areas and stay away from walls, utility poles and downed wires that could cause serious injury or death.

##### **KEEP CALM – USE COMMON SENSE**

**DO NOT** run through or outside buildings. The greatest point of danger is just outside doorways and close to outer walls.

#### IN CASE OF FIRE

Call the Fire Department. Then take what steps you can to control the fire until help arrives.

#### **DO NOT TURN OFF UTILITIES**

(Gas, water, and electricity) unless the lines are damaged. If broken pipes or wires are found, take the following steps:

## APPENDIX A – CONTINUED

**WATER** – if pipes are broken inside the house, shut off main valve on pipe bringing the water into the house.

**ELECTRICITY** – If the house is properly wired, trouble is very unlikely. If you are sure there is a short circuit, turn off electricity at meter box by pulling switch.

**GAS** – If gas pipes are broken inside the house, close valve at meter and call your gas company. Only the Gas Company should reopen meter to prevent explosions.

### FLOODS

Floods in Southern California are not expected every year as they are in other parts of North America. However, the records show that flood conditions could hit Long Beach.

#### WHAT TO DO

During heavy rains, check your floor furnace often. If it becomes flooded, turn off the pilot light and main burner. Remove water as soon as possible by using a pump, siphon or by bailing.

**IF** – The water rises above floor level, turn off electricity at main switch. If water enters wall or floor plug-ins, a short circuit may result, causing a fire.

**IF** – You have any suspicion that water coming from the faucets has been contaminated, be sure that it is purified before use. Purify by boiling, use of purification tablets, or adding ten drops of household bleach per gallon of water and allow to stand for 30 minutes. (If tablets are used, follow instructions on package.)

**IF** – The area in which you live is so badly flooded as to make escape impossible, move your emergency food, water supply, and blankets to an upper

## APPENDIX A – CONTINUED

floor or to the roof. Keep calm and wait for rescue. Do not hesitate to leave for safer areas when advised to do so.

**Note:** Sandbags may be useful in protecting your property from floodwaters. You should maintain supply if you live in low area.

### DRIVING IN FLOODED STREETS

**IF** – The brakes on your car are wet, they are useless. You can keep them relatively dry by keeping light pressure on the brake pedal while going through shallow water. Avoid driving on flooded streets or highways. Particularly avoid dips and low places.

## C A U T I O N

### KEEP AWAY FROM DISASTER AREAS

#### DO –

- Turn on television or radio for information and instructions. (Use your automobile or portable battery powered radio if electrical service is discontinued.)
- Keep flashlight handy.
- Know the telephone number of your family doctor or nearest one available in case of need.
- Learn simple first aid procedures.

#### DO NOT –

- Use candles, matches or other open flames.
- Enter damaged building until they have been inspected and approved by the Department of Building and Safety.
- Make unnecessary phone calls.

## BIBLIOGRAPHY

- Allen, D. R. Environmental Impact Statement: Long Beach Tidelands and Unit Oil and Gas Operations Wilmington and East Wilmington Oil Fields. City of Long Beach, Department of Oil Properties, January, 1973
- California Division of Mines and Geology. Urban Geology: Master Plan for California. Bulletin 198. Sacramento: State of California, 1973
- City of Long Beach, California. The General Plan, 1961.
- City of Long Beach, Department of City Planning. Conservation Element of the Long Beach General Plan, 1973.
- \_\_\_\_\_. Noise Element Draft of the Long Beach General Plan, 1975.
- \_\_\_\_\_. Open Space Element of the Long Beach General Plan, 1973.
- \_\_\_\_\_. Population and Growth in Long Beach (Draft). September, 1974
- City of Long Beach, Department of Fire. 1973 – 74 Annual Report of the Long Beach Fire Department. Long Beach 1974
- City of Long Beach. Long Beach Municipal Codes.
- City of Long Beach, Police Department. Monthly Statistical Report, December 1974. Unpublished report, Long Beach, 1974.
- Fales, James M., Jr. "Fire Station Location." Public Management. International City Management Association, Washington, D.C., August 1973.
- Fire Engineering Magazine. "Master Fire Protection Plan." Fire Engineering. Washington, D.C., July, 1973
- Ghabadi, Ali. A. "A Study of the Existing Freeway Emergency Telephone System on Los Angeles Urban Freeways." Proceedings: Greater Los Angeles Area Transportation Symposium. Volume 14 Edited by A.D. Emerson. North Hollywood, California, 1974.
- Gruen Associates, Development Research Associates, Social Engineering Technology, and City Community Analysis Program Staff. Long Beach C.A.P. Findings and Recommendations. Long Beach: City of Long Beach, n.d.
- \_\_\_\_\_. Long Beach C.A.P. Survey and Analysis Report. Long Beach: City of Long Beach, n.d.
- Insurance Services Office. Municipal Survey Service Long Beach, California. San Francisco, California, 1973.
- Los Angeles County Earthquake Commission. San Fernando Earthquake. Los Angeles, November, 1971.
- Los Angeles County Regional Planning Commission. Preliminary Safety Element of Los Angeles County General Plan. County of Los Angeles, 1974.
- National Advisory Commission on Criminal Justice Standards and Goals. "Programs for Reduction of Criminal Opportunity." Community Crime Prevention. Washington, D.C., January, 1973.

## BIBLIOGRAPHY (CONTINUED)

- National Commission on Fire Prevention and Control. America Burning. Washington D.C.: U.S. Government Printing Office, 1973.
- National League of Cities. "Is Your City Prepared for a Major Disaster?" Nation's Cities. Volume II, No. 5. Washington, D.C., 1973.
- National Oceanic and Atmospheric Administration. A Study of Earthquake Losses in the Los Angeles, California Area. Washington, D.C., 1973.
- Nichols, D.R. Buchanan, Banks, J.M. Seismic Hazards and Land-Use Planning. Geological Survey Circular 690, U.S. Department of the Interior. Washington, D.C., 1974.
- Opinion Research of California. Citizen's Attitudes Toward Future Development. Long Beach: Opinion Research of California, March 1974.
- South Coast Region of the California Coastal Zone Conservation Commission. Geology Element of the South Coast Region. San Francisco, November, 1974.
- Southern California Association of Governments. A Study of Crime Prevention through Physical Planning. Prepared by the Dillingham Corporation. Los Angeles: SCAG, n.d.
- State of California, Office of the Attorney General, Attorney General's Building Security Commission. Preliminary Report to the California Legislature: Building Security Standards. Sacramento, California, 1973.
- Wiggins, John H. and Moran, Donald F. Earthquake Safety in the City of Long Beach Based on the Concept of Balanced Risk. Long Beach, California. May 1, 1970.

PROJECT TEAM  
Planning Department

Administration  
Earnest Mayer, Jr., Director  
Carl Mooers, Assistant Director

Project Direction  
Ellis K. Crow, Principal Planner

Research and Text  
Robert J. Dawson, Senior Planner

Graphics  
Pierre-Andre Monney, Associate Planner  
Jerry L. Butler, Associate Planner  
Thomas Albright

Editor  
Ellis K. Crow

Law Department  
Leonard Putnam, City Attorney  
Arthur Y. Honda, Deputy City Attorney

Department of Aeronautics  
Nicholas Dallas, Director  
Leonard C. Peterson, Administrative Assistant

Department of Building and Safety  
E.M. O'Connor, Director  
Marvin W. Hopewell, Assistant Director  
Frank L. Burke, Principal Engineer

Emergency Preparedness  
Evar P. Peterson, Coordinator  
Earl R. Pershing, Assistant Coordinator  
Jon N. Eby, Administrative Assistant

Department of Engineering  
Tom Marchese, City Engineer  
George Johnson, Deputy City Engineer

Department of Fire  
V.M. Jones, Fire Chief  
Paul R. Finley, Battalion Chief  
Allen R. Carter, Captain  
Gas Department  
Edward C. Wright, General Manager  
Harbor Department  
Thomas J. Thorley, General Manager  
Cort T. Johnson, Assistant Chief Harbor Engineer  
William Hartman, Harbor Safety Engineer

Department of Oil Properties  
Leonard Brock, Director  
Dennis Allen, Subsidence Engineer

Department of Police  
William J. Mooney, Chief of Police  
Jerry Lance, Planning and Systems

Public Service Department  
Robert E. Kennedy, Director

Department of Water  
Clyde N. Moore, General Manager  
Harold C. Levy, Assistant General Manager  
William P. Naylor, Engineering

The cooperation of the following agencies is gratefully acknowledge:

U.S. Naval Air Station, Los Alamitos  
California Department of Transportation  
Department of California Highway Patrol  
Douglas Aircraft Company  
Downtown Long Beach Associates  
Southern California Edison Company